ROADS AND STREETS

Apr, 1948 HIGHWAYS BRIDGES AIRFIELDS HEAVY CONSTRUCTION

34 TIMKEN® BEARINGS help "Heiliner" move earth FASTER

A 25-Ton *"bite" in 40 seconds!* The new "Heiliner" tractor-scraper manufactured by the Heil Company, Milwaukee, Wisconsin, takes deep bites, loads 16 yards in less than a minute, then carries the load away with positive, effortless action — all on Timken Tapered Roller Bearings. Timken Bearings hold moving parts in perfect alignment, insuring a smooth-working power train. They reduce friction, eliminating loss of speed and power. And they reduce wear to a minimum.

The "Heiliner" is equipped with 22 Timken Bearings in the tractor drive axle. 4 Timken Bearings are also used in the hydraulic pump, 4 on the scraper axle, and 4 in the power control unit.

No other bearing can give your equipment *all* the advantages you get from Timken Bearings —backed by 49 years of bearing research and development. Be sure they're used wherever wheels and shafts turn on the machinery you build or buy. And always look for the trade-mark "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address, "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

NORTH • EAST • SOUTH • WEST • • IT'S SCHRAMM !

the Air Compressor You Like to Operate

For these reasons — compactness, lightweight, ease of starting — users of Schramm Air Compressors have said they *like* to operate them.

Other features, however, enter into the usefulness of Schramm. There's 100% water cooled feature, allowing you to operate Schramm perfectly both summer and winter; mechanical intake valve, forced feed lubrication, to mention a few.

Schramm features make them the Air Compressors ideal for your many jobs . . . and the reason they're specified North, East, South and West. Write today for full data.

Compact

. . . no waste space, compressor and engine coupled into a single, rigid, permanently aligned unit . . . balanced to reduce wear and increase efficiency!

Lightweight

. . . Portables designed for quick handling to and from the job, stationary units vibrationless.

Easy to start

. . . Just push the built-in electric starter, and the Compressor starts . . . to give you a continuous amount of air.

TOOLS *for the* JOB

Schramm Inc. also has a complete line of Pneumatic Tools to offer and recommend for operation by their Compressors.

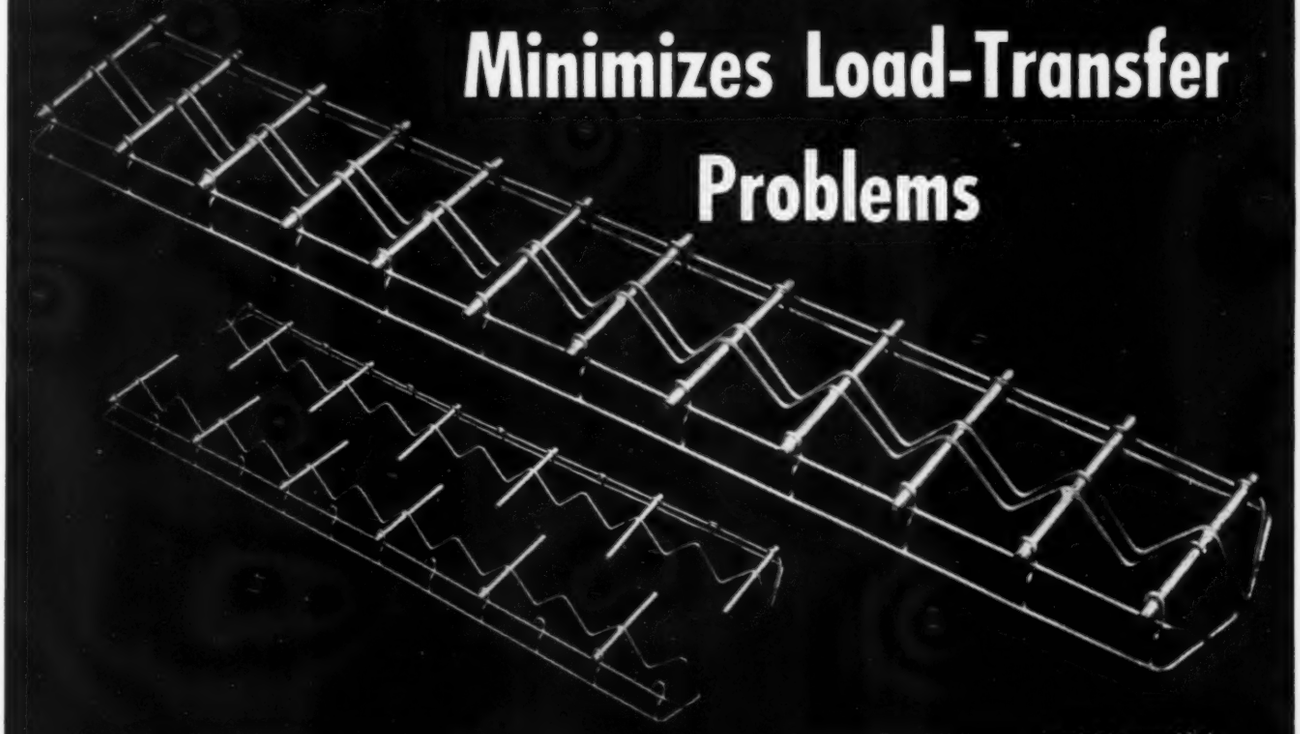
These include Rock Drills, Paving Breakers, Trench Diggers, Clay Spades, Backfill Tampers, Tie Tampers, Sheeting Drivers, Demolition Tools, Chain and Circular Saws.

Write for bulletins and prices.

SCHRAMM INC.

THE COMPRESSOR PEOPLE ◦ WEST CHESTER ◦ PENNSYLVANIA

Specially Designed DOWEL UNIT Minimizes Load-Transfer Problems



Unit consists of two identical sections. Note dowels welded to side frame and center wire. When used as expansion joint, filler is mounted on dowels of one section, then unit is reassembled.

Bethlehem Dowel Unit comes completely assembled, ready for use as contraction joint. Unit keeps dowels aligned in horizontal and vertical planes. Dowel tubes (not shown) permit movement of dowels in concrete.

Here's the road joint you've been looking for—a lightweight bar-dowel unit that is specially designed to minimize the load-transfer problems caused by heavy wheel loads.

Called the Bethlehem Dowel Unit, it consists of two identical sections, in each of which evenly-spaced dowels are rigidly welded to the side frame and center wire. The sections slide together quickly, and special tubes are then placed over the free ends of the dowels, allowing approximately 1 in. for expansion. The result is a unit which not only keeps the dowels accurately aligned in both horizontal and vertical planes, but also permits free movement of the dowels in the concrete.

The Bethlehem Dowel Unit saves time on the job, too, because it comes completely fabricated and assembled, ready for use as a contraction joint.

It can be handled easily by two men, and it also nests readily, making it economical to ship by rail or truck. It is adaptable to the designs and specifications of state highway departments, and can be used plain, as a contraction joint, or with the addition of joint filler, as an expansion joint.

All in all, the Bethlehem Dowel Unit is well worth looking into for highway or airport work. For details, contact the nearest Bethlehem sales office, or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

STEEL for HIGHWAYS REINFORCING BARS • BAR MATS • GUARD RAIL • TIE-RODS
GUARD RAIL POSTS • WIRE ROPE AND STRAND • SPIKES • HOLLOW DRILL STEEL • BOLTS AND NUTS
FABRICATED STRUCTURAL STEEL • SHEET AND H-PILING • DOWEL UNITS • TIMBER BRIDGE HARDWARE

ROADS AND STREETS

MAY, 1948 • VOL. 91 • No. 5

With Roads and Streets Have Been Combined Good Roads Magazine And Engineering & Contracting

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"San Francisco's Market Street Gets New Track Zone Pavement"

"Plows Plowed Less Leaving More Snow in Good Old Days"

"Shims Over Settled Bents Restore Colorado Bridge"

—and many other useful and practical articles, based on nationwide field travels by the R and S editors and including contributions by leading engineers, officials and contractor personnel

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Gillette Publishing Company
Publication and Editorial Offices,
22 West Maple Street, Chicago 10, Ill.

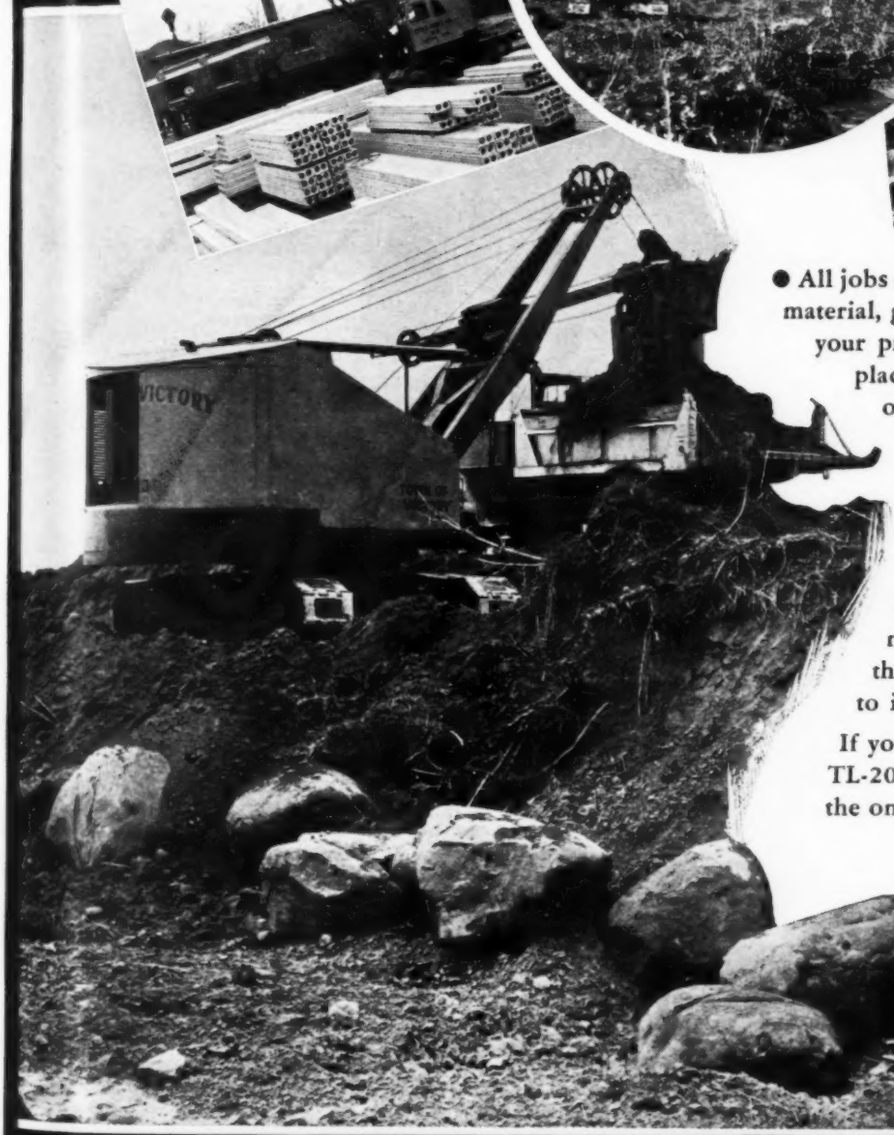
Acceptance under Act of June 5, 1934. Authorized April 16, 1948, at Mount Morris, Illinois. Published monthly. Subscription price $5.00 per year.

The TL·20 offers 50 combinations and 1000 profit possibilities


Single engine, Self-Propelled TL-20 rubber-tire crane.


Dragline mounted on 2-speed Chain Drive Crawler.


Rubber-tire Moto-Crane plus gooseneck hoe boom.



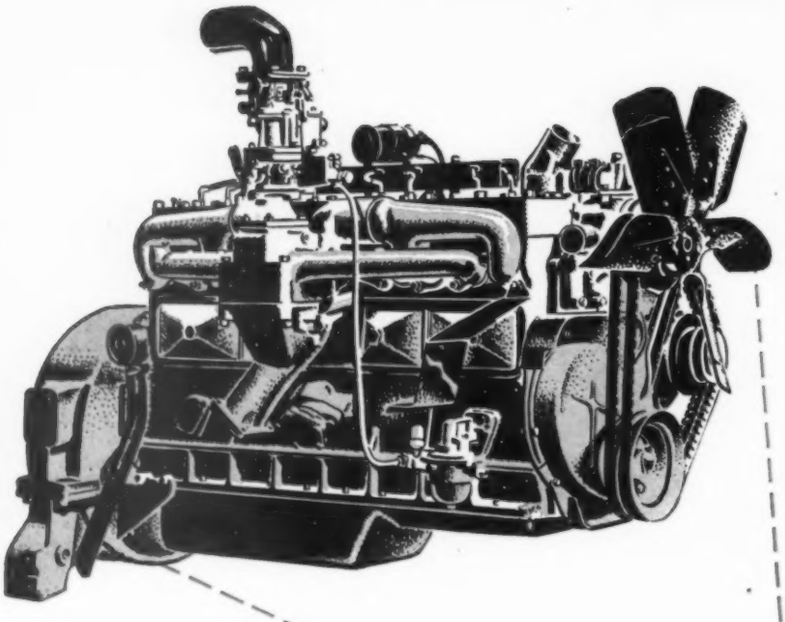
● All jobs are not the same; they vary in conditions, size, material, ground or travel conditions. It's important to your profits to have the right machine in the right place at the right time. That's why the selection of a Lorain TL-20 for today's job is your protection against tomorrow's ever-changing requirements.

With the TL-20 you have the choice of 50 working combinations—10 mountings and 5 interchangeable booms. And, remember, every one is a flexible combination. You can not only switch booms in a jiffy but because of the TL-20's modern Unit Assembly it's possible to interchange mountings as well.

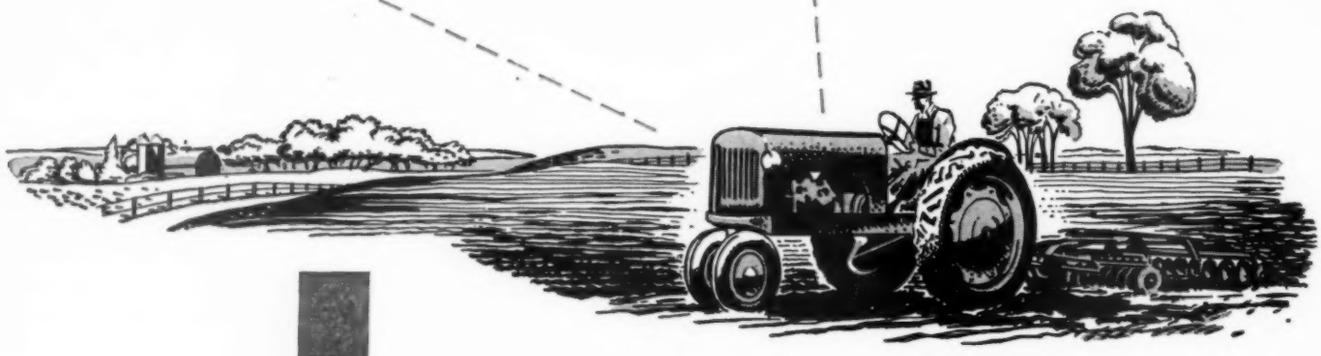
If you're one to plan ahead, plan now to see the TL-20 at your local Thew-Lorain distributor. It's the one high production unit in the ½ yd. class that can fit itself to both today's jobs and those of the future.

THE THEW SHOVEL COMPANY
Lorain, Ohio

Lorain® Thew TL 20 Lorain



FOR A BETTER DAY'S WORK



ON FARMS—IN FORESTS—IN OIL FIELDS—IN INDUSTRY AND ON THE HIGHWAYS!

• The true test of powered equipment is its record on the job! Time, profit and achievement are factors controlled by the type of unfailing horsepower that provides the vital energy. That's why Chrysler Industrial Engines are found in so many leading makes of powered equipment—on so many tough jobs. They have a pedigree of performance made possible by Chrysler's famed engineering and production skill. They are really built *For A Better Day's Work!*

CHRYSLER

INDUSTRIAL ENGINES

HORSEPOWER WITH A PEDIGREE

INDUSTRIAL ENGINE DIVISION, CHRYSLER CORP., 12200 E. JEFFERSON, DETROIT 31, MICH.

Why NORTHWEST is a BETTER BUY!

. . . it means more dollars for you!

When you buy a shovel you are buying a key machine. If your shovel is down your job is down! The advantages the right shovel brings you are going to play a large part in whether you make money or lose money.

Northwest Shovels, Cranes, Draglines and Pullshovels are money makers. This is proved by the demand for Northwest equipment among successful contractors everywhere who have used Northwests on all classes of work.

Northwest profitable performance comes from four main things —economy of operation—low-cost maintenance—dependability —and a combination of advantages that are not found in any other similar machine, size for size.

One out of every three Northwests sold is a repeat order because of high output resulting from such features as the "Feather-Touch" Clutch Control, the Cushion Clutch, Northwest steering, Uniform Pressure Swing Clutches, the Northwest Dual Independent Crowd, Northwest simplicity of design and a host of other Northwest features that will give you the kind of service you are looking for. Let us take your order for future delivery. Plan ahead to have Northwest. Follow the Northwest Crowd.

Follow the NORTHWEST CROWD

Still the Standard toward which others build!

If you have a REAL ROCK SHOVEL you won't have to worry about output in dirt

NORTHWEST ENGINEERING COMPANY
1504 Field Building • 135 South LaSalle Street • Chicago 3, Illinois

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

DEPENDABLE

For hundreds of Heavy

53 H.P. at 1500 R.P.M.

THE INTERNATIONAL UD-9

DIESEL POWER UNIT

There is no better heavy-duty engine of half a hundred horsepower than this 4-cylinder, valve-in-head International Diesel. It provides dependable, low-cost power for operating rock crushers, conveyors, fans, pumps, hoists, pavers, compressors and many other units of equipment for construction and road building.

The UD-9 develops 53 horsepower at 1500 r.p.m. This is *working horsepower,* for industrial intermittent load applications. And it is economical power because of the operating efficiency and ruggedness of the International design.

Yes, for low-cost, dependable power there is no question about the superiority of the engine or power unit that bears the International name. Your International Industrial Power Distributor is prepared to prove this to your complete satisfaction.

Industrial Power Division

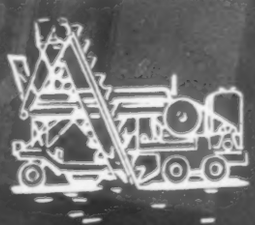
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue · Chicago 1, Illinois

Road surfacing—two UD-9 Diesels power the job economically.

Ditching moves ahead on schedule with UD-9 power.

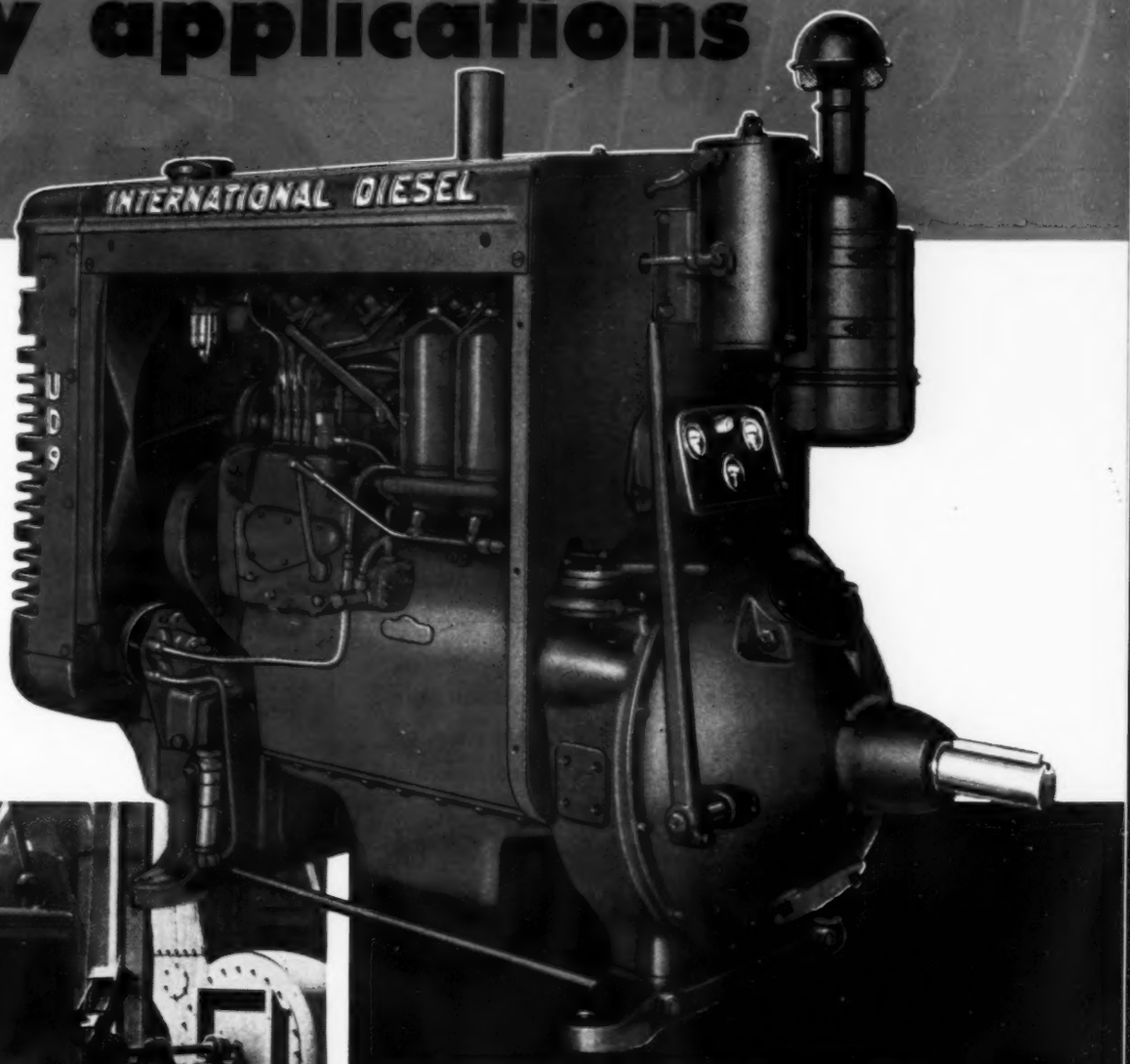
CRAWLER TRACTORS
POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL



LOW-COST POWER

-Duty applications



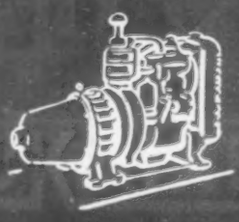
Dependability is built into International Diesel Power Units. Construction features that make them superior for all heavy-duty powering jobs include: self-contained, all-weather starting system; advanced design combustion for maximum utilization of fuel; single-plunger International fuel injection pump that meters fuel accurately to meet all load conditions as interpreted by a sensitive, variable-speed governor and torque control; induction-hardened crankshaft; precision-type bearings; full-pressure lubrication; by-pass type thermostatic cooling, and adequate, efficient filtering of fuel, lube and air.

Low-cost power for large-capacity blowers: the UD-9.

Applications of the UD-9 Diesel Power Unit as shown in the pictures to the left are representative of the many and diverse uses to which this dependable power may be put. International Diesels have the lugging ability—the hang on under load—to pull through and deliver the power you require at all times . . . at lowest cost for fuel, lubrication and maintenance.

INTERNATIONAL HARVESTER

Industrial Power



Swings LESS To Move MORE

SHOVEL

With the Badger, only the bucket, boom, turntable and mast swing. The heavy main deck, engine, transmission and main frame are STATIONARY—to counterbalance heavier loads and avoid objectionable tail-swing.

The Badger makes more swings per minute, day, month and year . . . wastes no fuel or power swinging extra weight . . . digs the hardest "diggable" material . . . can work in closer quarters.

Profits are made by working fast and saving time. Clipping a few seconds off each dig-swing-dump cycle means more yardage at the close of the day.

Before you take delivery of another shovel, ask your nearby A-W Distributor to tell you the whole story of the convertible Badger.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS

DRAGLINE

TRENCH HOE

Also Convertible to Crane, Piledriver, Etc.

BUILDERS OF ROAD MACHINERY

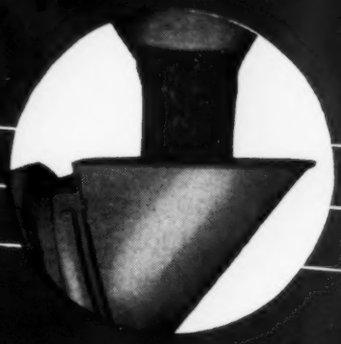
Austin Western

SINCE 1859

THE "NEW LOOK" in TRUCK MIXERS

Here's the BLAW-KNOX Hi-Boy

WITH THE EXCLUSIVE REVOLVING HOPPER



FOR A BETTER WORLD and Coal Show SOLDIER FIELD CHICAGO JULY 16-24, 1948

The "new look" in truck mixers—the Blaw-Knox HI-BOY—has a built-in Revolving Hopper that reduces your charging time 50%. Its discharge elevation is higher without adding over-all height to the mixer.

That tight-seal revolving hopper—and many other exclusive and practical features—has been job-proved by hard work on many projects. One contractor produced 80,000 cu. yds. with ten HI-BOYS in four months—with nary a leak in the seal or major trouble of any kind.

The Blaw-Knox HI-BOY is really a concrete producer—both in quality and quantity—*it's the truck mixer you have been waiting for.*

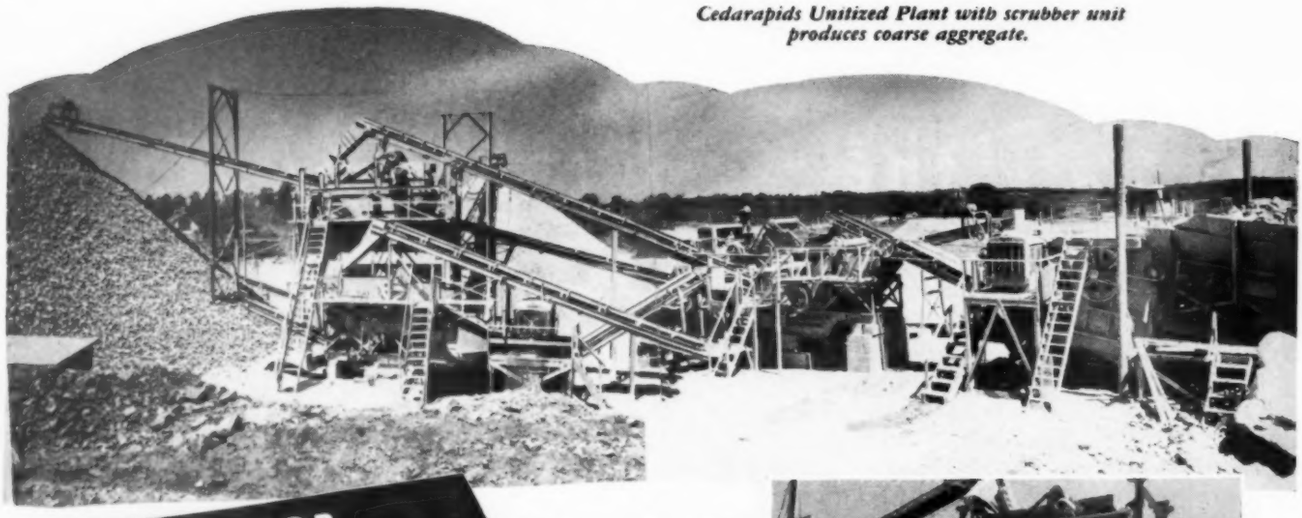
Now available in 2, 3 and 4½ cu. yd. sizes. We are ready to equip you with Blaw-Knox HI-BOYS.

BLAW-KNOX DIVISION of Blaw-Knox Company
2003 Farmers Bank Building • Pittsburgh 22, Pa.
New York • Chicago • Philadelphia • Washington • Birmingham
See your nearest Blaw-Knox distributor

Bulletin No. 2223 TELLS ALL . . . send for it

BLAW-KNOX
knows how to build TRUKMIXERS

Cedarapids Unitized Plant with scrubber unit produces coarse aggregate.



THE JOB

Producing Aggregates for FT. GIBSON DAM

Twin hammermill installation produces sand with fineness modulus of not less than 2.40 or more than 2.90 with not more than 0.10 variation.

THE EQUIPMENT

2 CEDARAPIDS UNITIZED PLANTS

THE CONTRACTOR

M. O. WEAVER, Inc.
Des Moines, Iowa

BETTER ROADS FOR A BETTER WORLD — 45th Annual Convention and Road Show — SOLDIER FIELD CHICAGO — JULY 16-24, 1948

When M. O. Weaver, Inc. of Des Moines, received the contract for producing 600,000 tons of aggregate and 250,000 tons of manufactured sand for the Ft. Gibson Dam near Muskogee, Oklahoma, they selected Cedarapids equipment as best able to meet the specifications. Two Unitized Plants and twin hammermills were set up to produce the five finished sizes: manufactured sand, No. 4 to ¾", ¾" to 1½", 1½" to 3" and 3" to 6", all from limestone. The production of 250 tons per hour enabled M. O. Weaver, Inc. to fulfill their contract for aggregates specified *on time* profitably.

Whether your aggregate production requirements call for a few thousand yards or several hundred thousand, it will pay you to follow the lead of contractors who know construction equipment best and buy Cedarapids.

Cedarapids — Built by IOWA

THE IOWA LINE
of Material Handling Equipment Includes:

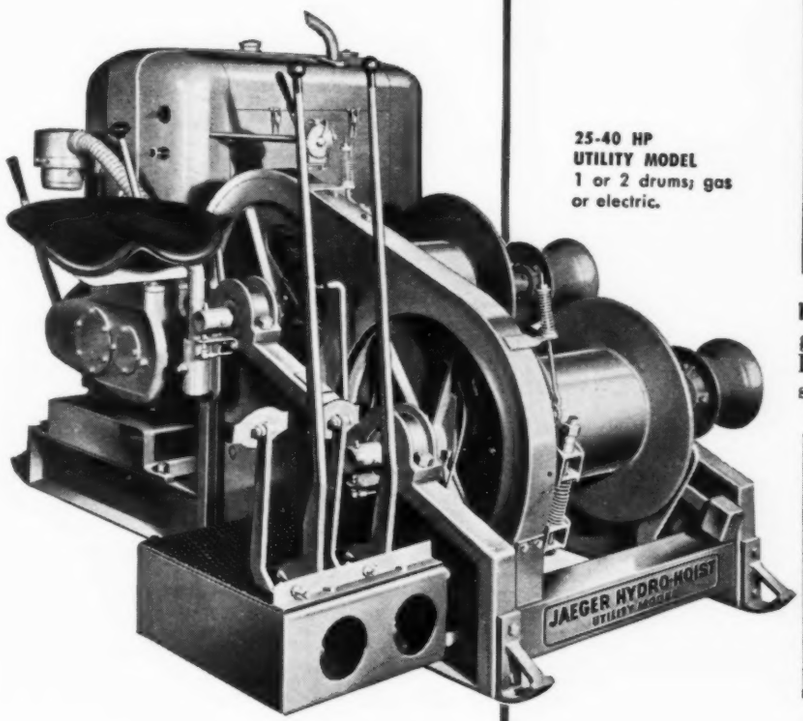
ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS – STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
FEEDERS – TRAPS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

PRODUCT OF IOWA

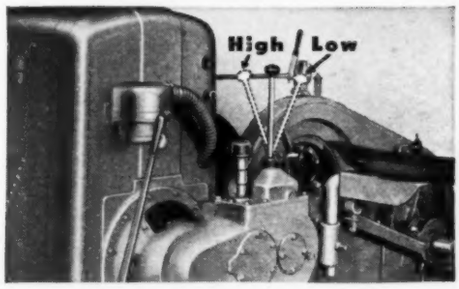
IOWA MANUFACTURING CO. CEDAR RAPIDS, IOWA U. S. A.

the hoists that make all others obsolete

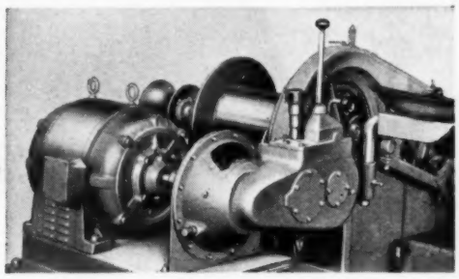
JAEGER TWO SPEED HYDRO-HOIST



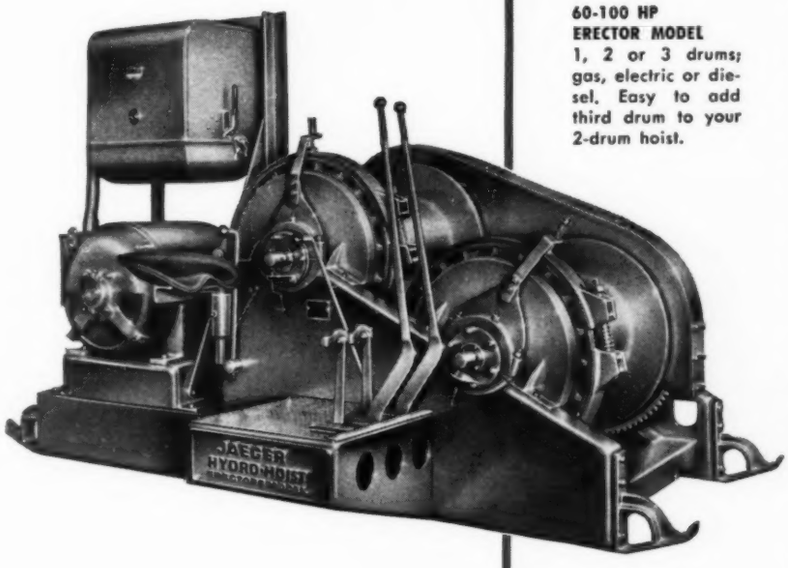
25-40 HP UTILITY MODEL
1 or 2 drums; gas or electric.



INSTANT LEVER SHIFT to powerful "low gear" or fast "high gear" — in the same hoist. Handles a wider range of work; speeds your lighter loads.



AUTOMOTIVE TRANSMISSION for interchangeable use of standard gas, electric or diesel power at efficient 1800 rpm.



60-100 HP ERECTOR MODEL
1, 2 or 3 drums; gas, electric or diesel. Easy to add third drum to your 2-drum hoist.

HYDRAULIC FINGER-TIP CONTROL for easy, fast, accurate, safe handling of all loads — just like $25,000 cranes.

SELF-ENERGIZING, INSTANT-RELEASING HYDRAULIC CLUTCHES with a single simple outside adjustment.

AIR-COOLED HYDRAULIC BRAKES.

FABRICATED STEEL DRUMS AND BOX-TYPE FRAME, rigid and unbreakable construction.

TIMKEN BEARINGS in all "Erectors" models; all shaft bearings in self-aligning bearing blocks.

SEE YOUR JAEGER DISTRIBUTOR for full details or send today for Catalog H-8.

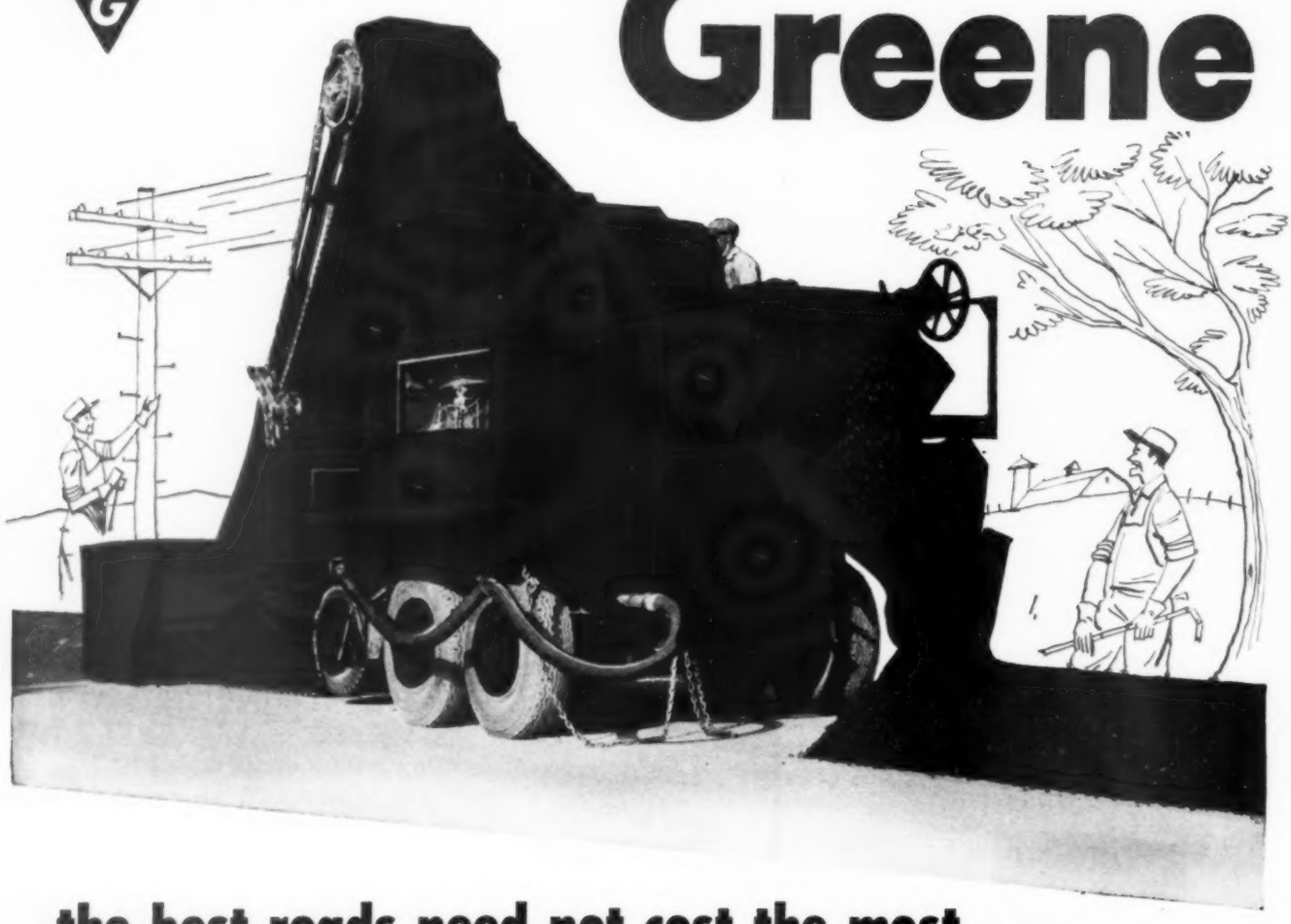
PUMPS • AIR COMPRESSORS
TOWERS • PAVING MACHINES
MIXERS • TRUCK MIXERS

THE JAEGER MACHINE CO.,

COLUMBUS 16, OHIO

regional offices: 1504 Widener Bldg. Philadelphia 7 · 226 N. La Salle St. Chicago 1 · 235 American Life Bldg. Birmingham 1

Barber-Greene



the best roads need not cost the most . . .

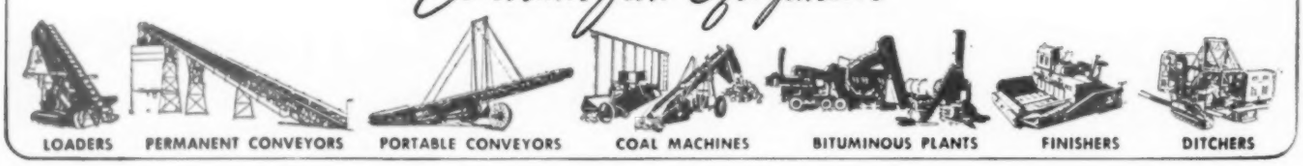
When it comes to a choice of road-surfacing methods, the Barber-Greene Travel Plant offers distinct cost-saving advantages. It produces a properly proportioned asphalt mix—*the correct amount of bitumen for every cubic yard of aggregate—plus thorough mixing.* And you pay no premium for this performance—for volumetric measurement and controlled, twin pugmill mixing are standard Barber-Greene Travel Plant features.

Travel Plant work is a speedy one-pass operation. The aggregate windrow is picked up and continuously discharged as a ready-to-spread mix. Traffic can be maintained during the mixing process.

The B-G Mixer can be used separately in central plant set-ups; and the B-G Bucket Loader can be used independently in cost-saving loading and light excavating jobs. Write for full information.

BARBER · GREENE COMPANY, AURORA, ILLINOIS

Constant flow Equipment



LOADERS · PERMANENT CONVEYORS · PORTABLE CONVEYORS · COAL MACHINES · BITUMINOUS PLANTS · FINISHERS · DITCHERS

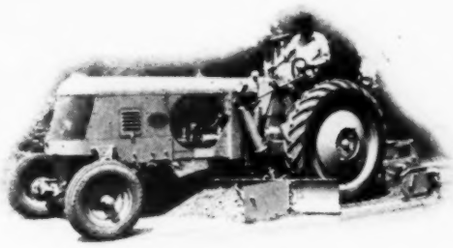
That Frown
Becomes a Smile
OF SATISFACTION
When
YOU SWITCH TO

HUBER ROAD MACHINERY

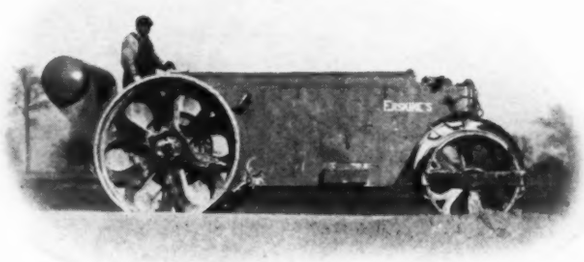
Don't let high road building or maintenance costs get you down . . . or machinery inadequate for your particular needs eat up your budget.

There is no need for it when you can turn to Huber Road Machinery with definite assurance that it will not only lick high costs but protect the budget dollar as well.

Your local Huber distributor will gladly demonstrate all of the Huber features to you . . . and what they mean to you in dependable, low cost service.



HUBER MAINTAINER
Just the machine for cutting maintenance costs on light jobs. It is a bulldozer, lift-loader, patch roller, snowplow or rotary broom—all in one.



HUBER 3-WHEEL ROAD ROLLER
Automotive type. In sizes from 5 to 12 tons. The result of 35 years of experience.

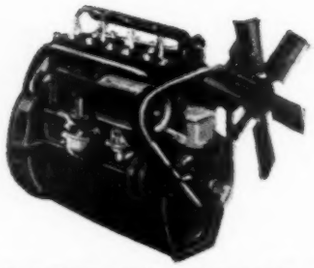
HUBER TANDEM ROLLER
Variable weight—it gets around easily and economically. From 3 to 12 tons.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

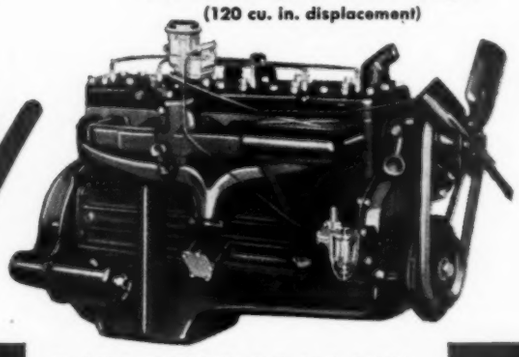
HUBER

3 Wheel • Tandem
ROAD ROLLERS and MAINTAINERS

Here's the New FORD Power-Family



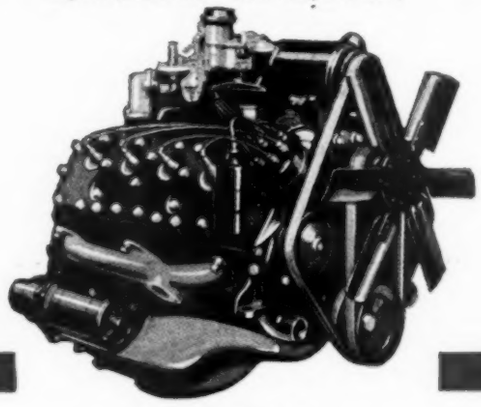
Ford 120 Four Cylinder Industrial Engine
(120 cu. in. displacement)



Ford 226 and 254 Six Cylinder Industrial Engines (226 and 254 cu. in. displacement)

1 "FOUR" . . . 2 "SIXES" . . . 2 "EIGHTS"

Here they are . . . five great, brand-new Industrial Engines built by Ford! Look 'em over—every one the product of Ford experience . . . every one with famous Ford reliability built in . . . every one complete and ready to run! For *new* power, for *right* power, use Ford Industrial Engines, completely new!



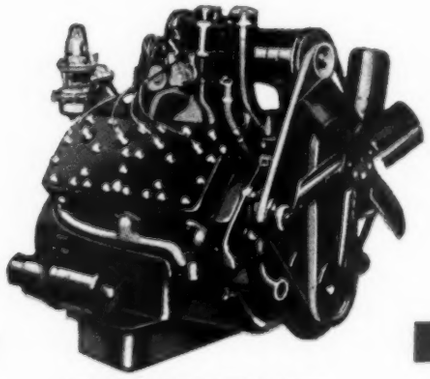
Ford 337 V-8 Industrial Engine
(337 cu. in. displacement)

When It's FORD POWER . . . it's right 3 ways!

RIGHT POWER—A full power range, from the maker that knows power best . . . from Ford!

RIGHT FEATURES—Ford Industrial Engines incorporate the latest advancements of Ford's progressive engineering. You're never outdated when you pick Ford power.

RIGHT SERVICE—Ford Dealers provide complete parts and service facilities around the world. They keep Ford power on the job, save you time and money!

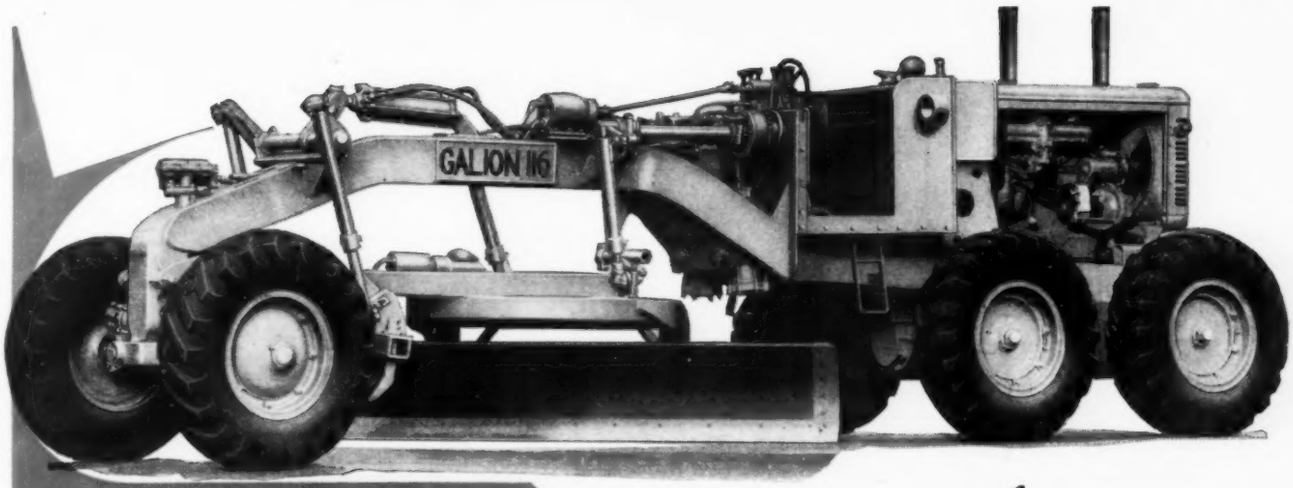


Ford 239 V-8 Industrial Engine
(239 cu. in. displacement)

FORD MOTOR COMPANY
INDUSTRIAL AND MARINE ENGINE SALES DEPARTMENT
3513 Schaefer Road • Dearborn, Michigan

Listen to the Ford Theater, Sunday afternoons, NBC Network. See your newspaper for time and station.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED



THE NEW GALION NO. 116 MOTOR GRADER

for

EXTRA HEAVY DUTY

IT'S HEAVIER

23,285 lbs. to 30,000 lbs. - depending on the extra attachments.

IT'S MORE POWERFUL

Rugged 100 H.P. Diesel engine and all-gear tandem drive.

Designed and constructed to handle the heaviest and toughest kind of work.

Standard equipment includes:

- Hydraulic Control
- Booster Steering
- Electric Starter
- Same Size Tires (14:00 x 24) on all wheels

Write for Specification Leaflet No. 310

BETTER ROADS FOR A BETTER WORLD — 45th Annual Convention and Road Show — SOLDIER FIELD CHICAGO — JULY 16-24, 1948

GALION Estab. 1907

THE GALION IRON WORKS & MFG. CO.
General and Export Offices
Galion, Ohio, U. S. A.

GRADERS · ROLLERS

BUILT TOUGHER—MORE FLEXIBLE

Tuffy Slings

NOW DELIVERED TO YOU AS A COMPLETE PACKAGE WITH REQUIRED FITTINGS—READY TO HITCH ON TO TOUGH JOBS

Up to now, no rope construction ever performed in sling service to suit Union Wire Rope technicians. Producing a sling construction that would stand up during long service on any kind of a load, under any kind of pull and using every type of hitch, has been a major project in Union Wire Rope laboratories for a long, long time.

Tuffy Slings are the result, the basic secret of which is an entirely new 9 part rope construction with strands so interlaced that the extra strength, flexibility and wearing toughness are amazing in every type of service. You have to see it to believe it.

Machine Fabrication Insures Uniformity

Not only did Union Wire Rope engineers set sling construction many years ahead—they also originated a method of machine fabricating the basic rope of which Tuffy Slings are made thus eliminating the inequalities of hand making.

Cutting Any One or Two of the 9 Interlaced Strands Will Not Result in Rope Stranding.

Eye Splices Develop More Than 95% of Rope Strength —Will Resist Crushing Flat

Tuffy Sling strand interlacing makes possible the forming of eyes that will not crush flat with splices which develop 95% of the strength of the rope.

Unique Construction Prevents Rotating of Load

On straight pulls, Tuffy Slings do not rotate the load since their interlaced strands neutralize the load torque.

Flexibility Prevents Kink Damage

Tuffy Slings are so ultra-flexible that kinks are readily straightened out without damage to the rope.

Proof-Test to Twice Their Safe Working Load Limit

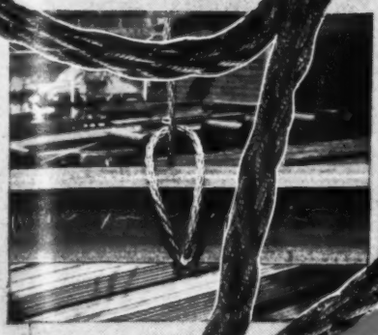
Metal tags on Tuffy Slings give their safe working load limits on straight pulls. Each sling or leg of a bridal sling is proof-tested to twice the safe working load.

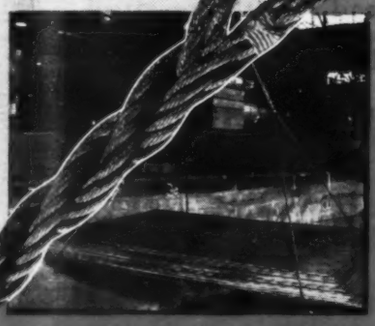
UNION WIRE ROPE CORP

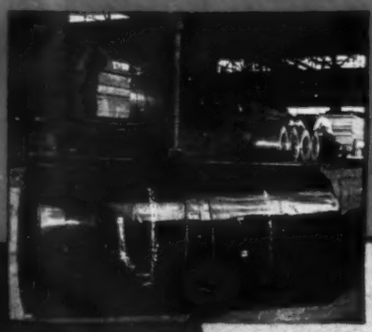
IBLE WEAR LONGER

ENTIRELY NEW *Interlaced* 9 PART CONSTRUCTION

Patents Pending







So Flexible you can tie it into a knot or kink and unkink it without materially damaging the rope.

Watch the Old Ways Out and the New Ways In at Chicago, July 16-24, 1948

GOOD ROADS SHOW

It's the World's Fair of Construction. No construction man can afford to miss it. It is there that professional and practical men of the industry will determine upon the best methods, materials and machines with which to speed up the reconstruction of America's arteries of progress—highways, roads, streets, airports and waterways as well as flood control, soil conservation and irrigation.

At Soldier Field, Chicago, July 16-24, 1948, in a gigantic arena the size of 30 football fields, you'll see hundreds of mechanical miracles ranging from a ¼-inch Tuffy Sling up to machines weighing 200 tons.

Without the cost-cutting, man-hour-saving machinery which the construction equipment industry has designed, engineered and developed, the tremendous construction job confronting America could not be accomplished for ten times prevailing costs.

Be there! Watch the old ways out and the new ways in at the World's Fair of Construction.

UNION WIRE ROPE CORPORATION

2200 Manchester Ave. Kansas City 3, Mo.

☐ Send Facts on Tuffy Slings Including Safe Working Loads of 9 Sizes Which You Deliver as Complete Packages.

For Tuffy Slings — See Your Union Wire Rope Distributor (Listed in Yellow Section of Your Telephone Directory) and/or Send This Coupon.

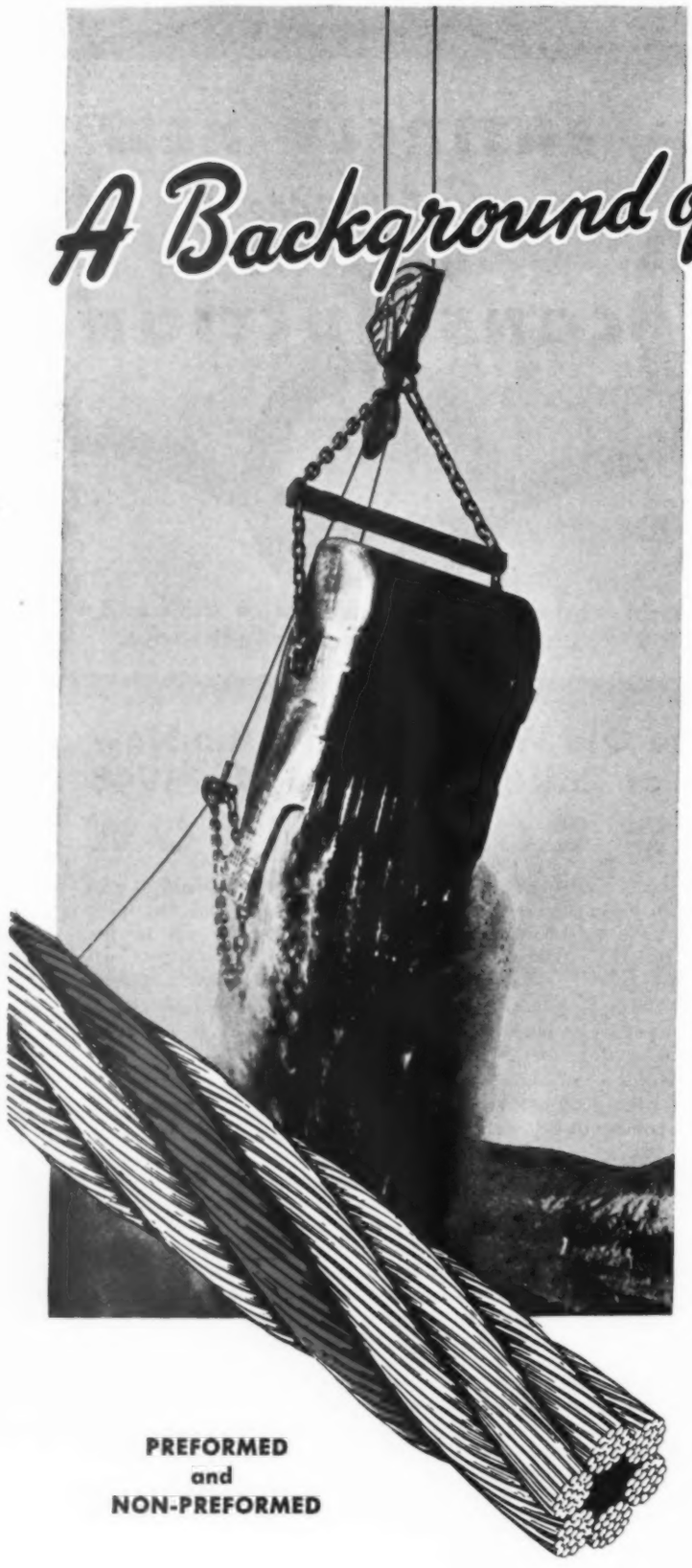
FIRM NAME .....

ADDRESS .....

CITY ..... ZONE .....

STATE .....

A Background of PERFORMANCE



PREFORMED
and
NON-PREFORMED

When you specify "HERCULES" (Red-Strand) Wire Rope, you select a product that has proved its dependability – time after time – by the acid test of actual service.

Such a long and *consistent* record of performance is not a matter of chance; instead, it is the result of many definite factors that have always governed the design and manufacture of "HERCULES" (Red-Strand) Wire Rope.

For wire rope qualified to withstand the stresses and strains encountered on tough jobs...use "HERCULES" and benefit by its time and money saving ability.

"HERCULES"®
the DEPENDABLE WIRE ROPE *for any* TOUGH JOB
® REG. U.S. PAT. OFF.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

ESTABLISHED 1857

5909 KENNERLY AVENUE • ST. LOUIS 12, MISSOURI

NEW YORK 6	CHICAGO 7	DENVER 2	SAN FRANCISCO 7	PORTLAND 9	SEATTLE 4
90 West Street	810 W. Washington Blvd.	1554 Wazee Street	520 Fourth Street	914 N. W. 14th Avenue	3410 First Avenue South

A FAST-MOVING MIXER...

3½—S Tilting Mixer. Capacity, 3½ cu. ft, plus 10% overload (A.G.C. rating).

Quickly spotted and towed, this half-bag mixer is a cost-cutting combination of strength, lightness and efficiency. Other Ransome Blue Brute Mixers in capacities up to 126 cu. ft.

AIR AT SHORT NOTICE...

A light-weight, handy compressor that can get around *fast!* Powers light hand-held Rock Drill, Paving Breaker or equivalent air tools through its easy-breathing Feather* Valves — with unfailing dependability and economy.

*Reg. U.S. Pat. Off.

60′ Contractor's Portable Compressor. Other Blue Brute Compressors up to 500′ capacity.

PLENTY OF RESERVE POWER...

Blue Brute Self-Priming Centrifugal Pump. Built in A.G.C. sizes to A.G.C. standards.

Now! a Contractor's Pump by Worthington, the world's largest pump makers, with fast, dependable pickup that saves time and money. Rust- and abrasion-resistant, with built-in self-priming.

FOUR FAST WORKERS...

Though tough and powerful, Blue Brute Air Tools are light and compact, with the easy handling that means more satisfied workers . . . more work done . . . more profit for you.

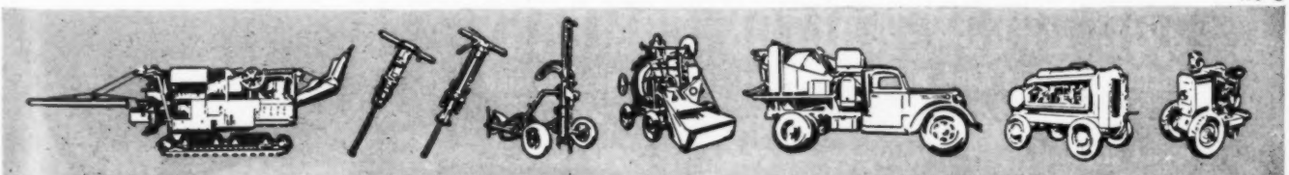
Paving Breaker, WB-50 | Rock Drill, WJ-45 | Clay Digger, W-19 | Backfill Tamper, W-8

BUY BLUE BRUTES

WORTHINGTON

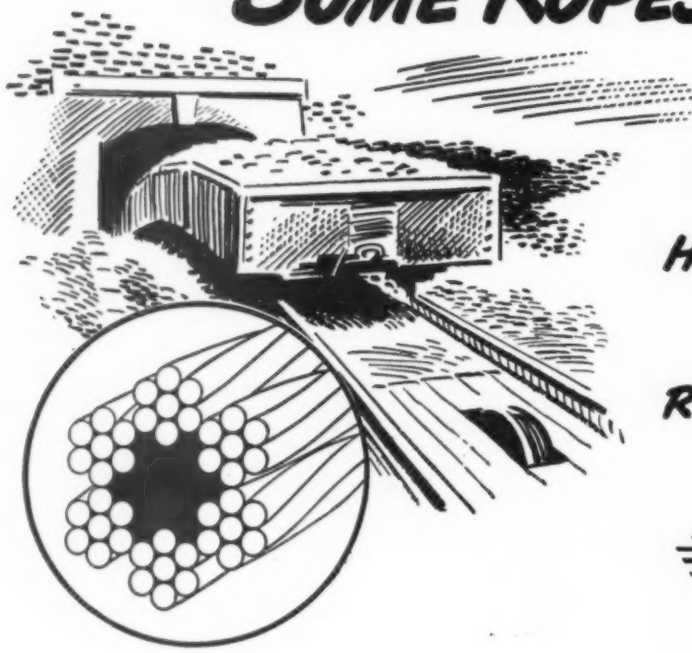
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts. Distributors in all principal cities.

H8-2



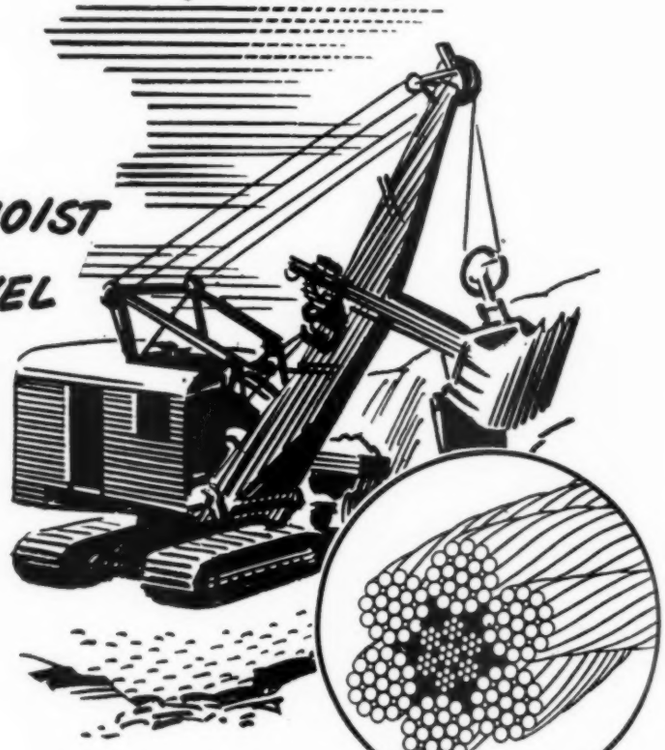
IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

SOME ROPES FOOL YOU



U-W 6x7 WIRE ROPE IS GOOD FOR SLOPE HAULAGES BECAUSE IT IS COARSE AND RESISTS ABRASION —

BUT...



FOR BOOM FALLS AND HOIST ROPES ON A POWER SHOVEL IT'S TOO STIFF. HERE WE RECOMMEND USING U-W 6x19 FILLER WIRE CABLE WHICH IS MUCH MORE FLEXIBLE

For longest and best service, always specify
U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.

THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4 | 737 W. Van Buren Street, Chicago 7 | 241 Oliver Building, Pittsburgh 22

Le Roi Announces the 31 Clay Digger

— with new design features that reduce both digging and upkeep costs

Here's a digger that has everything you want. Just take a look at all these design advantages:

● **Short 19-inch length** — is responsible for the fine easy-handling balance of the new 31 clay digger.

● **It weighs only 18 pounds** — A man does more work with the new Le Roi 31, and uses less effort.

● **Exclusive new buffer design saves time and money** — This new buffer consists of molded rubber bonded to hardened split steel rings. There is only one piece to handle. Changing tools requires just a few seconds and no effort at all. Your operator does more digging.

● **Air consumption is low, efficiency high** — The 31's new trouble-free valve design uses air sparingly. The high efficiency — that is, the 31's ability to produce a lot of work — is made possible by a unique arrangement of valve-chest differentials.

● **Only the 31 has an integrally-built lubrication system** — Oil from a large reservoir in the handle is metered into the live air stream and carried to every working part.

● **The 31 is sealed from dirt and grit** — the new rubber buffer keeps destructive foreign matter out of the digger.

● **Cylinder life is greatly increased by the use of renewable spacer and chuck bushings** — Moreover, the handle, cylinder, and retainer are made from sturdy drop forgings. That is why Le Roi 31's serve you efficiently for years.

Give your men a clay digger that they like to use — give them a digger that makes them more productive — give them Le Roi 31's.

Your nearby Le Roi distributor can show you how the 31 Clay Digger design pays off in lower costs. Write us for specifications and latest literature.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

NEW YORK • WASHINGTON • CLEVELAND • BIRMINGHAM
TULSA • BUTTE • SAN FRANCISCO

RD-16

Le Roi 31 Clay Diggers give you a good opportunity to reduce your digging costs

ACCURACY *that rolls out smooth as glass!*

- ✓ **Hydraulic Controls** — for easy handling
- ✓ **Continuous Course Correction**— corrects irregularities with successive courses
- ✓ **Powerful Six Cylinder Engine** — power to handle the heaviest truck
- ✓ **Four Wheel Drive**
- ✓ **Cutter Bar**—overlaps and compacts joint—"crowds" and compacts materials
- ✓ **Power Cut-Off**—permits carrying load over intersections and eliminates tag-end run-outs
- ✓ **End Gates** — permit feeding material out to sides with cutter bar extension
- ✓ **Screed Heater** — assures better handling of material
- ✓ **Crowning Adjustment** — for any crown or bank
- ✓ **Either Rear Roller** — can be disengaged for quick turning
- ✓ **Hopper** — big . . . adjustable . . . for narrow pavements
- ✓ **Sturdy, Heavy Construction**—that stands the strain of work without constant rebuilding
- ✓ **Adnun Carryall**—easily attached . . . makes moving up on jobs easy

● Look at that course behind the Adnun. That black top will roll out as smooth as a billiard table. Continuous Course Correction, the remarkable feature of the Adnun that corrects irregularities with each successive course, means smoother pavements. It means less preparation of subgrade and old pavements when recapping. It means true automatic leveling.

Add to this the important fact that the Adnun is built for the punishment that comes with handling heavy trucks. Contractors say Adnuns don't have to be rebuilt as often. Check the other features that Adnun brings you and plan to have one on your next black top contract.

See page 110

THE FOOTE COMPANY, INC.
1936 State Street, Nunda, New York

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER
MULTIFOOTE CONCRETE PAVERS
FOOTE KINETIC MIXERS

● For your concrete jobs—ask about the MultiFoote Duo-Mix (Double Drum) 34-E Paver and the MultiFoote Single Drum 34-E Paver. They bring you advantages found in no other concrete paver.

OFF TO THE TIPPLE WITH A— 40 TON LOAD ON Firestone ROCK GRIPS

40 TO 50 TONS of coal to the load . . . 21 loads in 7 hours . . . a total of 900 tons of coal hauled from the pit to the tipple, three miles away!

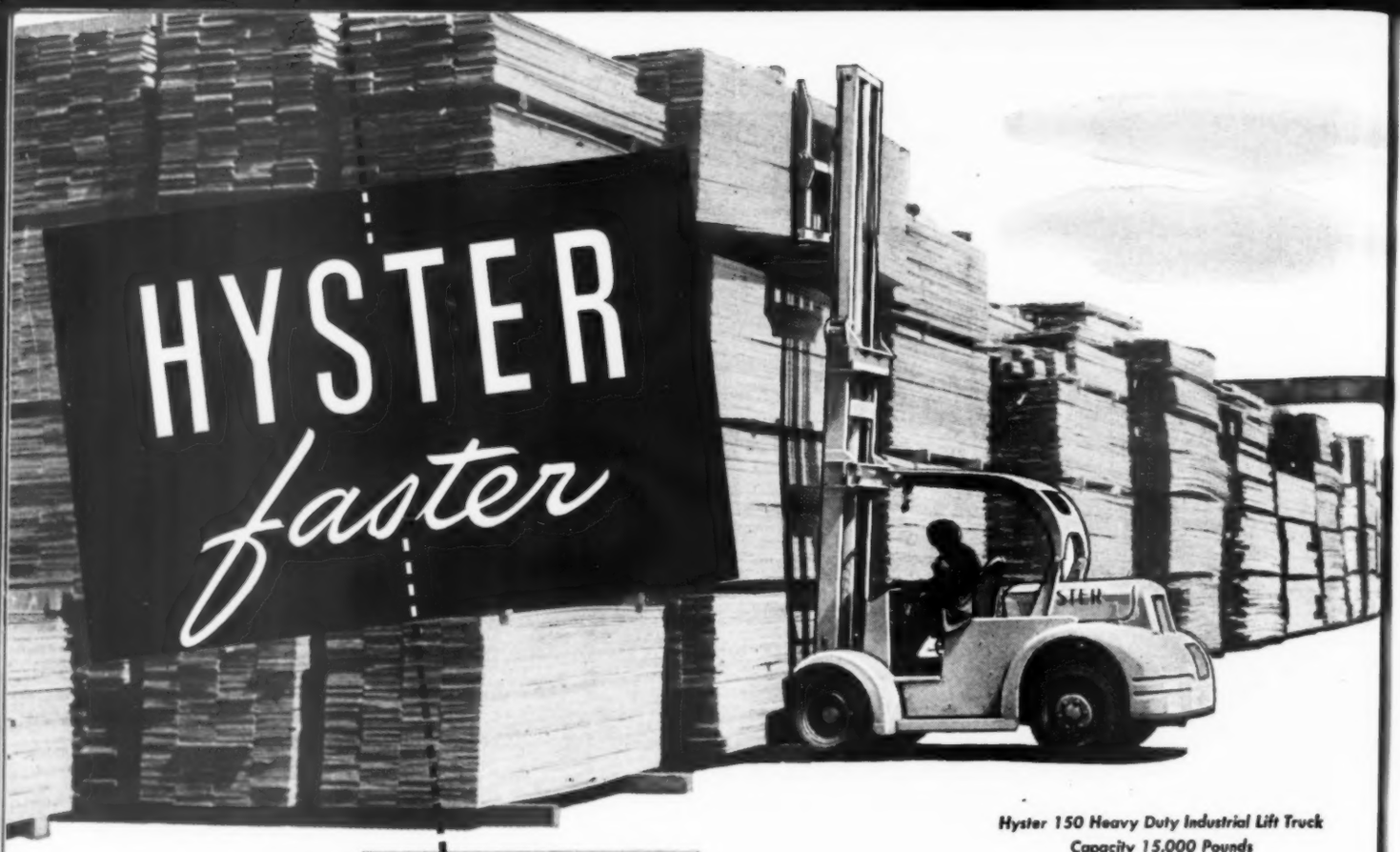
That's an average day's work for one of the big bottom dump units at the United Electric Coal Company's Fidelity Mine No. 11 near DuQuoin, Illinois.

In this operation where minutes mean dollars, Firestone Rock Grips are cutting downtime to a new low. That's because they are built with the extra strength and the extra toughness necessary to carry those 90-ton gross loads month in and month out and stay on the job every minute. They stand the gaff.

On any job, Firestone Off-the-Highway tires will slash downtime, cut costs, increase profits. Give them a trial and they will prove it on your jobs.

Listen to the Voice of Firestone every Monday evening over NBC

FIRESTONE OFF-THE-HIGHWAY TIRES



Hyster 150 Heavy Duty Industrial Lift Truck
Capacity 15,000 Pounds

WITH VICKERS HYDRAULIC EQUIPMENT FOR STEERING . . . HOISTING . . . TILTING

The "Hyster 150" heavy duty industrial lift truck handles more work easier and faster because it utilizes Vickers Hydraulic Equipment for steering, hoisting and tilting.

Vickers Hydraulic Power Steering Booster makes steering easy no matter how tough the going. Road shock cannot be transmitted to the steering wheel because the steering load is carried by a hydraulic cylinder—not by the driver's muscles. An integral relief valve automatically protects the system against damage by overload.

The Vickers Double Pump that supplies the power for hydraulic steering also provides oil under pressure for actuating the cylinders that lift and tilt the load. This Vickers Vane Type Pump is exceptionally efficient and dependable. The exclusive hydraulic balance construction prolongs pump life by entirely eliminating pressure-induced loads and consequent wear. The vanes provide automatic take-up so that wear has no appreciable effect on performance. In addition, the pump automatically maintains correct running clearance throughout a wide range of operating conditions.

Vickers Double Pump for simultaneously supplying power to two separate hydraulic circuits.

Vickers Improved Hydraulic Power Steering Booster.

For additional information regarding other advantages of these Vickers units, write for the following bulletins: Vickers Vane Type Pump—Bulletin 36-12. Vickers Power Steering Booster—Bulletin 47-30.

3473

VICKERS Incorporated • 1432 OAKMAN BLVD. • DETROIT 32, MICHIGAN
DIVISION OF THE SPERRY CORPORATION

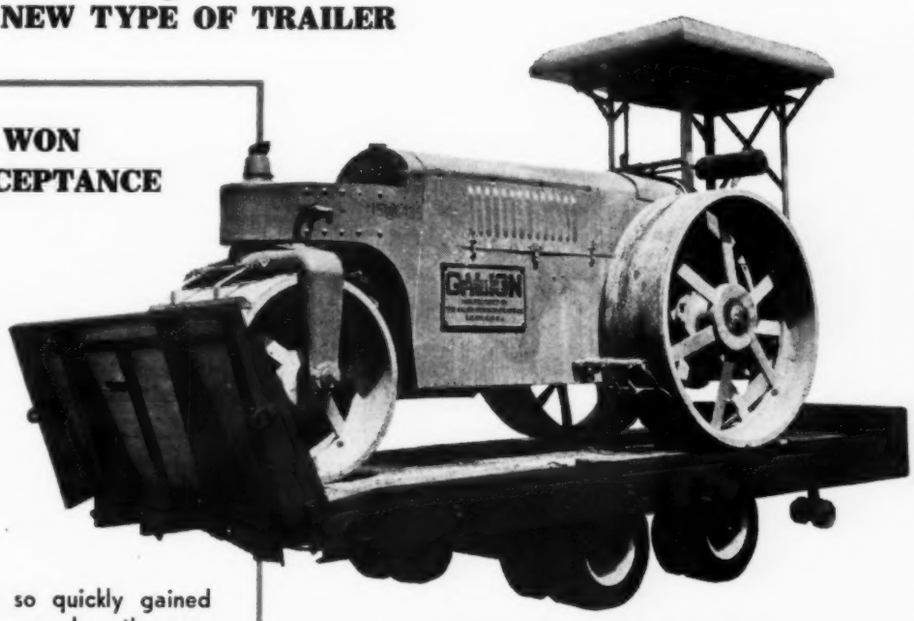
Application Engineering Offices:—ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEWARK
PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT FOR 27 YEARS

TIP-TOP

AN ENTIRELY NEW TYPE OF TRAILER

THAT HAS WON OVERNIGHT ACCEPTANCE



Few products have so quickly gained favorable recognition as has the new TIP-TOP trailer. On the market but a few short months, this revolutionary development in trailer design has already been widely acclaimed as the solution to an important problem in the construction field.

And why not? The TIP-TOP Trailer makes loading and unloading of mobile equipment far faster, safer and easier . . . eliminates all need for blocking, skidding or winching.

In addition, it has a wide variety of other uses that greatly increases its general utility value. Practically any type of commodity, such as lumber, steel, pipe, etc., can be hauled since stake pockets are furnished as standard equipment. Stakes and racks can be supplied on request.

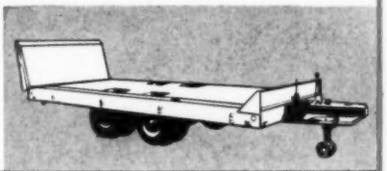
Sturdily constructed with pressed steel frames, TIP-TOP Trailers are available in 7-ton capacity (single axle) or 12-ton capacity (tandem axle) and provide a liberal factor of safety for unavoidable overloads. Also, where desired, special capacity sizes can be made to specifications.

TIP-TOP Trailers are equipped with approved lights and reflectors, vacuum, air or electric brakes and comply with all state laws.

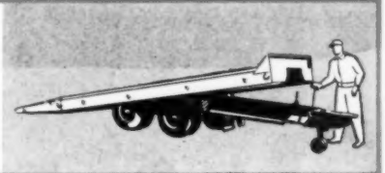
INQUIRIES ARE INVITED FROM QUALIFIED DISTRIBUTORS.

TIP-TOP TRAILERS MAKE LOADING and UNLOADING AS SIMPLE AS THIS!

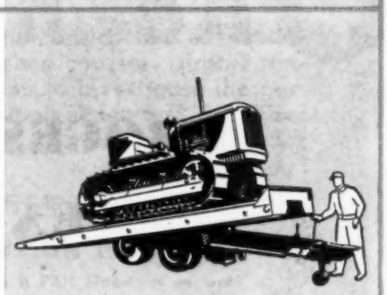
1. Trailer before loading.



2. Tail skid is lowered and loading platform is raised by hydraulically controlled, hand operated pump.



3. Equipment is driven on under its own power with tail skid serving as ramp. Release valve is then opened so that loading platform will return to its original position and automatically lock. The tail skid is then hydraulically raised to shorten overall vehicle length and to serve as barrier for load.
In unloading, same procedure is followed and equipment is driven off under its own power.



TIP-TOP

TRAILERS

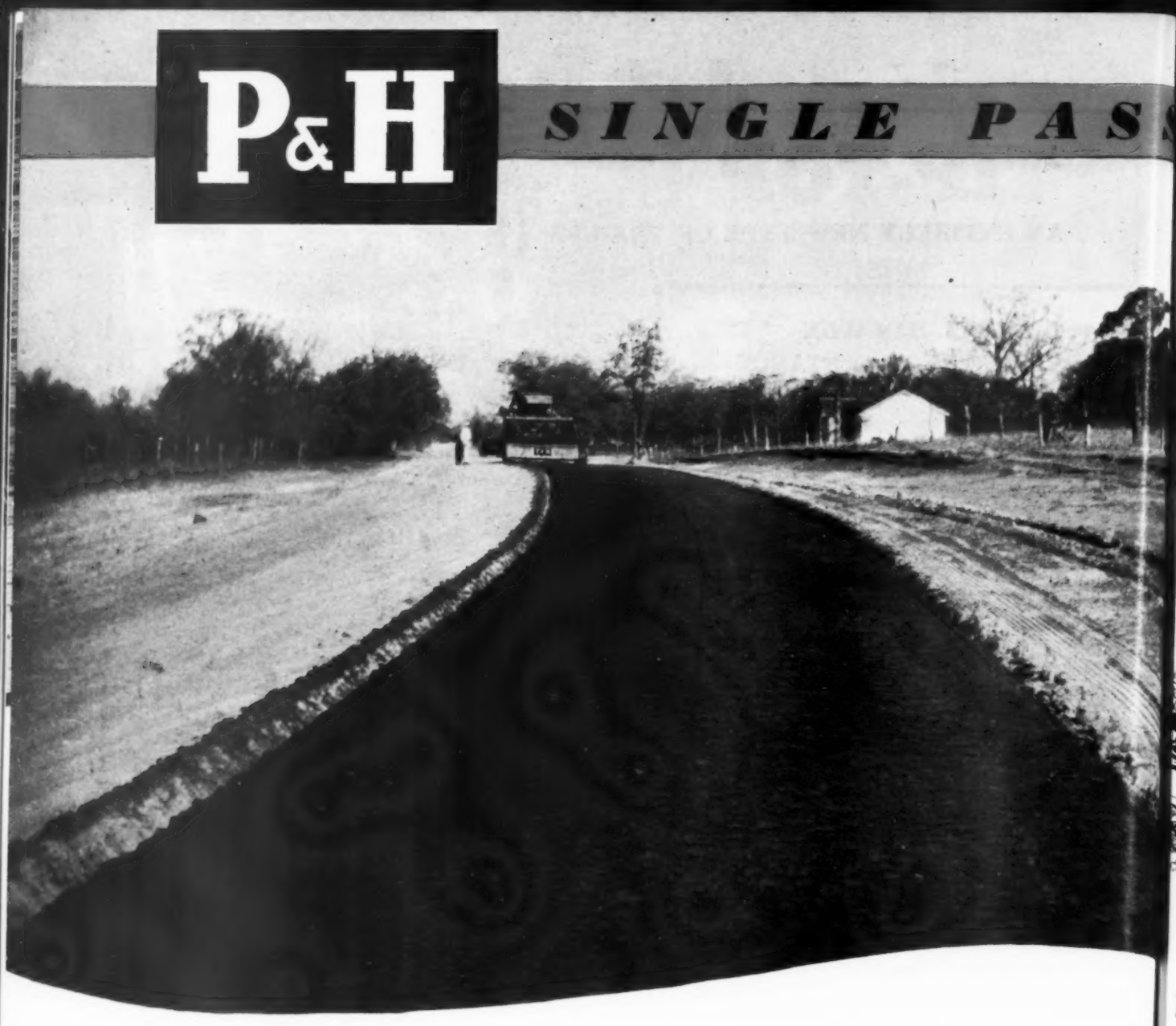
Patent Pending

ARTHUR REHBERGER & SON, Inc.
320 Ferry Street Newark 5, N. J.

Vehicle Manufacturers For Over 60 Years

For additional information on TIP-TOP Trailers, write for folder R.

P&H SINGLE PASS



One machine

PROCESSES 8,000 sq. yds. daily

ON TEXAS PROJECT!

On this soil-bituminous state highway in Texas, a P&H Stabilizer with one operator processed on an average 8,000 square yards per day in a single pass.

This highway, over 7½ miles long, and 20 feet wide, was processed to a depth of 6 inches. Maximum production often reached 1,200 square yards per hour!

There's little that's unusual in the speed of this Texas job. Such reports are being received from all over the country — where P&H Single Pass Soil Stabilizers are at work building excellent, all-weather surfaces more quickly.

Making maximum use of in-place materials, the P&H Stabilizer performs with accurately predetermined results, *all 8* basic requirements of soil stabilization — and does it with any type admixture and at a rapid pace. Full information mailed on request.

SOIL STABILIZERS

These are the facts about the job!

Location of Project — State highway 274, Henderson County — from Tool to Kaufman County line.

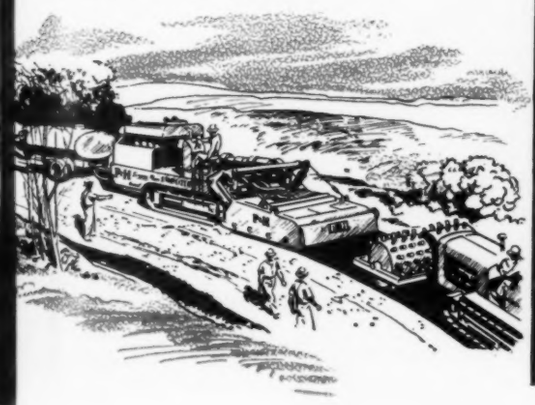
Length of Project — 7.68 miles.

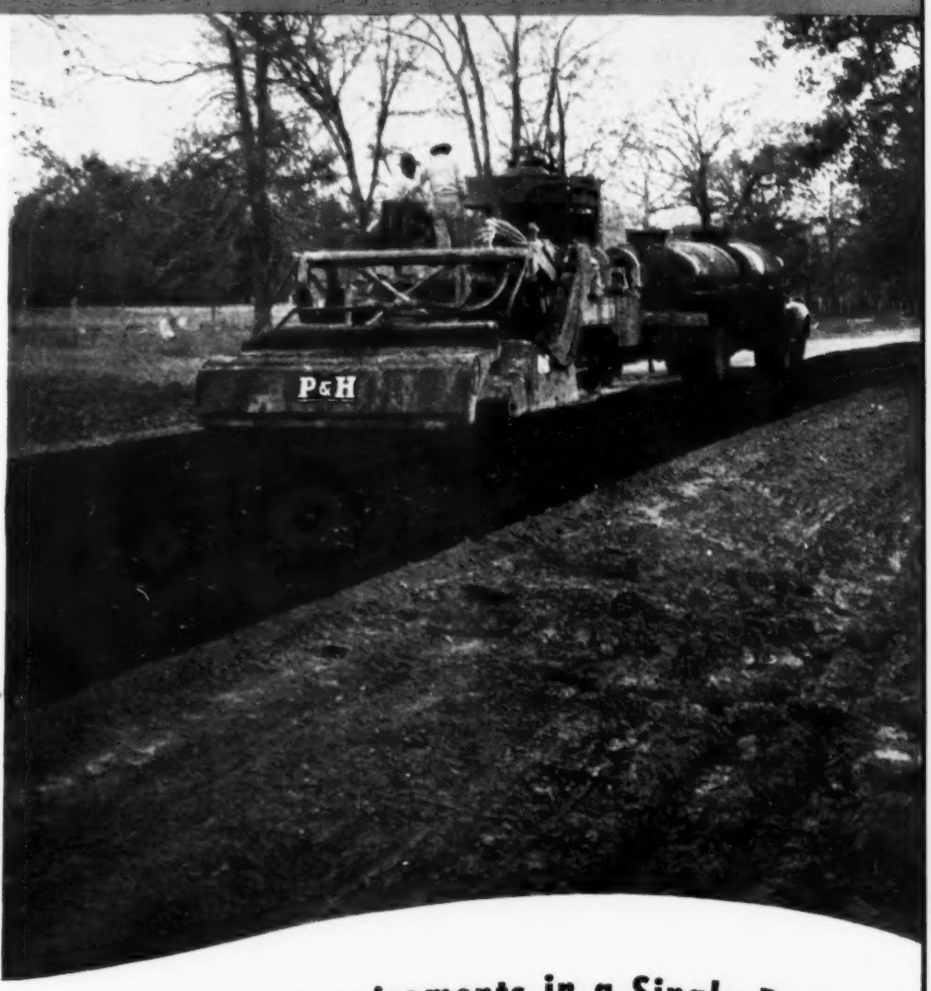
Width of Roadway — 20 feet (2 lanes of 10 feet each).

Type of Soil — Loamy sand.

Stabilizing Agent — 4 gal. cracked fuel oil per sq. yd.

Rate of Production — Average 8,000 sq. yds. per working day.





The P&H Stabilizer Performs These 8 Basic Requirements in a Single Pass!

The report from Texas proves again its ability to fulfill these 8 basic requirements of soil stabilization with definitely predetermined results.

1. Control processing depth for accurate proportioning.
2. Pulverize the soil thoroughly.
3. Blend materials uniformly.
4. Create a true sub-grade.
5. Disperse the liquid through the entire volume in measured quantity.
6. Mix the coated material uniformly.
7. Lay the completely processed material in a fluffy, even depth, ready for compaction.
8. Do all these things in one pass — at a good rate of speed.

If you are engaged in the construction of secondary highways, streets, base courses, airport runways, etc., it will pay you to investigate the performance of the P&H Single Pass Soil Stabilizer under conditions similar to your own. Ask for the facts.

NEW SOUND MOTION PICTURES!

If you would like to see a P&H Stabilizer at work processing soil-stabilized roads — learn how it does it — write us about the showing of our new full color, sound motion pictures. One covers soil-cement and the other soil-bituminous work.

P&H

SINGLE PASS STABILIZERS

4496 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

BITUMINOUS MATERIAL UNDER POSITIVE CONTROL .... at all times

Sheboygan County

OFFICE OF
COUNTY HIGHWAY COMMISSIONER
SHEBOYGAN, WISCONSIN

October, 22, 1947

Standard Steel Works
North Kansas City
Missouri

Gentlemen:

May I take this opportunity to tell you how well satisfied we are with the Bituminous Pressure Distributor we purchased from you last summer.

We have used our distributor both on bituminous construction work as well as seal coat work and our operators like it very much.

We feel that especially for seal coat work, your full circulating spray bar, having uniform pressure throughout, assures even application of the material on the road bed. Because the valves are located on the inside of the spray bar and are completely surrounded by hot circulating material, we are not confronted with unnecessary costly delays due to frozen spray bar sections.

This special feature gives the operator positive control over bituminous material at all times.

At such times as the Sheboygan County Highway Department needs another distributor, it will be a Standard Steel Works Distributor, unless something better becomes available.

Sincerely yours,

SHEBOYGAN COUNTY HIGHWAY COMMISSION
Anthony C. Droppers
Commissioner

ACD:mjw

NO THIN SPOTS TO BREAK OR FAT SPOTS TO ROLL—

Absolute accuracy of Pressure and absolute temperature uniformity over every inch of the Standard Steel 24" full circulating spray bar, *assures even application on the road bed.*

PRODUCTION COSTS REDUCED— JOB COMPLETED ON TIME

No unnecessary and costly delays due to frozen spray bar sections—*every job is completed on time.* Application at uniform and proper temperature assures good penetration.

WRITE TODAY for the name of your nearest dealer and complete information.

OTHER PRODUCTS:
ASPHALT DISTRIBUTORS • TAR KETTLES • MAINTENANCE DISTRIBUTORS • BURNERS STREET FLUSHERS • SPRAY UNITS • SUPPLY TANKS • SURFACE HEATERS • SHOULDER ROLLERS... and Agricultural Equipment.

Built to the Highest
Standard

NORTH KANSAS CITY, MO., U.S.A. **Standard Steel Works**

Built to Cut Hauling Costs

Bottom-Dump Euclids are designed and built for the specific job of moving big loads over off-the-highway hauls at the lowest cost per ton or yard moved. Here are some of the reasons for the outstanding production and performance records of Bottom-Dump Euclids on a wide range of earth moving jobs:

SPEED AND CAPACITY . . . loaded top speeds to 31.6 m.p.h. and capacities of 13 to 24 cu. yds. struck measure or 20 to 36 ton payloads; diesel engines of 150 to 275 h.p.

EASE OF HANDLING . . . short wheel base of tractor and the universal hitch permit sharp, fast turns and provide excellent maneuverability.

QUICK, CLEAN DUMPING . . . full length and width door openings and smooth, steep hopper sides shed the load quickly for non-stop dumping.

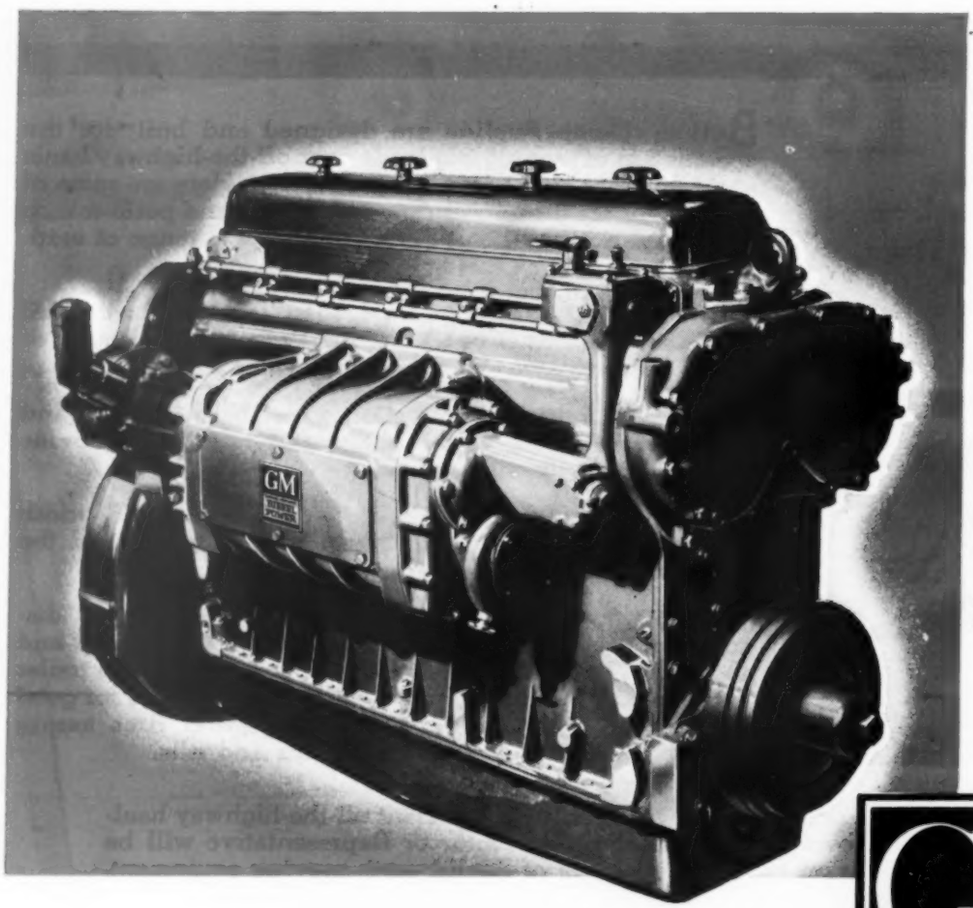
TRACTION AND FLOTATION . . . excellent weight distribution achieved by wedge shaped hopper of trailer and the Euclid hitch design . . . a large percentage of the trailer and payload weight is carried on the drive wheels for good traction . . . large single drive and trailer tires assure excellent flotation for soft haul roads and fills.

These are just a few of the Euclid features that add up to efficient off-the-highway hauling and greater profits for owners. Your Euclid Distributor or Representative will be glad to supply complete data on all current models of Euclid earth moving equipment.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

EUCLIDS *Move the Earth*

GREAT FOR FINE



Diesel Brawn Without the Bulk

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES.. Up to 200 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS.. Up to 800 H.P.

GENERAL MOTORS

GM
GENERAL MOTORS
DIESEL POWER

DIESELS EQUIPMENT

Today the list of manufacturers, who offer their contractors equipment powered with General Motors "71" Diesels, reads like a "Who's Who" of the industry. They know what these powerful, modern 2-cycle Diesels can do.

They know that these engines with all their power are compact and fit in available space—that they do their work easily and fast. Their 2-cycle operation makes them responsive and quick to pick up under load. They step up the work done by any kind of equipment.

GM Diesels have been designed for easy servicing. Pistons, liners, valves, and many other parts, are the same for every size Series 71 engine, so there is the maximum interchangeability of parts.

No wonder, then, that America's finest contractors' equipment is being furnished with the General Motors Series 71 Diesel engine.

LEADING MANUFACTURERS OF THE FOLLOWING EQUIPMENT OFFER GM SERIES 71 DIESEL ENGINES IN THEIR PRODUCTS:

Air Compressors
Arc Welders
Asphalt Plants
Buses
Cableways
Cranes
Distillation Equipment
Ditchers
Draglines
Dredges
Earthmoving Loaders
Evaporation Units
Feed Mills
Fire Pumps
Hoists
Industrial Locomotives
Locomotive Cranes
Logging Loaders
Logging Yarders
Mining Pumps
Motor Graders
Off-The-Road Vehicles
Oil Field Equipment
Pavers
Power Scrapers
Pumps
Road Rollers
Rock Crushers
Rotary Soil Tillers
Saw Mills
Screening Plants
Shovels
Soil Stabilizers
Stave Mills
Tractors
Trucks
Wellpoint Pumps

IT'S WISE FOR YOU TO SPECIFY GM DIESEL

Cut TRACTOR COSTS one/half with an Ottawa Hydraulic Front End Loader

Tractors used ½ the year cost twice as much to own as tractors used all year 'round.

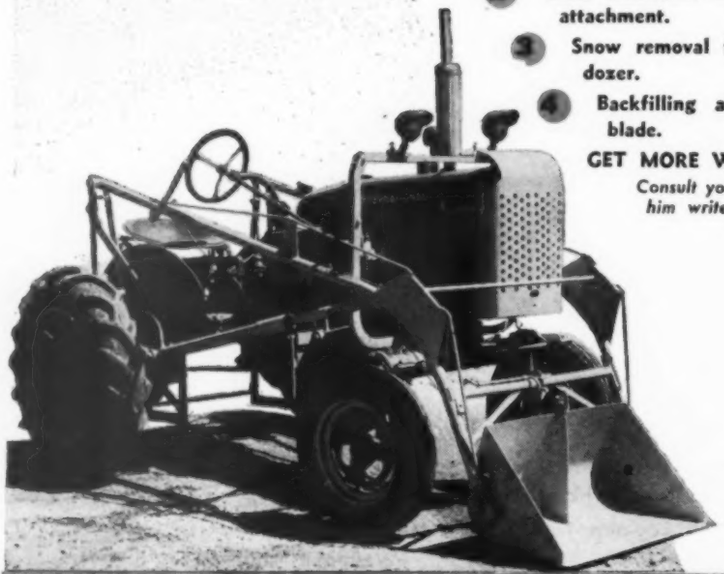
There is an Ottawa loader designed for use with light industrial tractors such as the International A and Case V A I illustrated here. These loaders have been approved by Industrial Engineers of leading tractor manufacturers.

These Ottawa Loaders and their attachments have enabled State highway departments and other light industrial tractor owners to cut light tractor operation costs over ½. Keep your tractors working all year 'round. Here are some of the jobs the Ottawa Hydraulic Front End Loader will make it possible for your light tractors to do when they would normally be idle.

1. **Load trucks with cinders, sand or salt for treatment of icy streets or highways.**
2. **Clear sidewalks of snow using right or left angle snow blade attachment.**
3. **Snow removal from Business district streets by using light bull-dozer.**
4. **Backfilling and leveling of roadway shoulders with light dozer blade.**

GET MORE WORK OUT OF THE TRACTORS YOU NOW OWN

Consult your industrial tractor dealer, if he can't supply you have him write or write yourself for full information and price list.



"The Ottawa" REG. U.S. PAT. OFF. INDUSTRIAL HYDRAULIC FRONT END LOADER PAT. NO. 2219931 OTHER PATS. PEND.

Ottawa STEEL PRODUCTS, Inc.
INDUSTRIAL DIVISION
OTTAWA, KANSAS • U. S. A.

The Slower Movement of Gears in Eaton Planetary Design Means Quiet Operation, Minimum Wear

In the Eaton exclusive planetary construction the "planet gears," when transmitting power in the low speed range, turn over at very slow speed. They are locked out completely when the axle is operating in the high speed range. This means quiet operation, minimum wear, and longer axle life. Outstanding performance records are proof of Eaton quality and design. See your truck dealer for complete information about Eaton 2-Speed Truck Axles.

EATON 2-Speed Truck AXLES

NEARLY A MILLION EATON 2-SPEED AXLES IN TRUCKS TODAY

EATON MANUFACTURING COMPANY

Axle Division

CLEVELAND, OHIO

MACK *Dimensional Control*

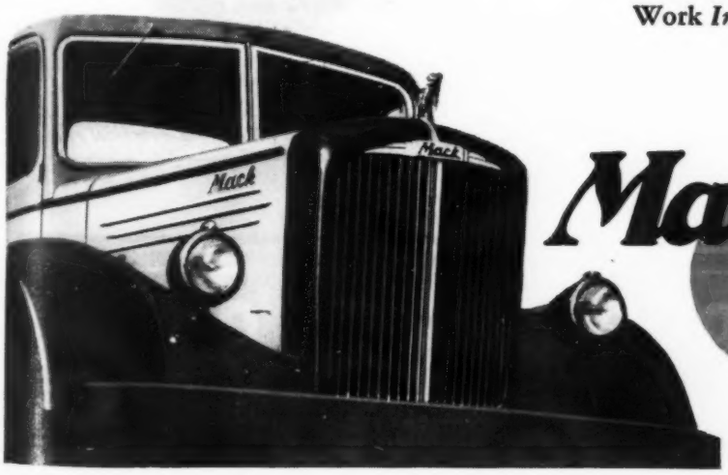
what is it?

how does it benefit a truck operator?

Simply described, Mack Dimensional Control is the planning and fabricating of every part in a Mack truck for perfect fit and uniform interchange. It calls for uncompromising adherence to exact clearances and rigid tolerances without equal in the truck industry.

How does Dimensional Control benefit you as a truck operator? It gives you trucks that are truly precision-engineered . . . trucks whose parts fit and work together in perfect co-ordination. It explains why you get uniformly thrifty performance and enduring reliability from every Mack truck you operate. And it saves you time and money on repairs because it makes possible easy re-assembly without need for prefitting of parts.

Mack Dimensional Control is one more example of the thorough planning and advanced thinking that goes into every Mack truck. It all adds up to this: You Get More Work *Out* of a Mack Truck – Because We Put More Work *Into* a Mack.



Mack

trucks for every purpose

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

BETTER JOINT PROTECTION

with Servicised Para-Plastic

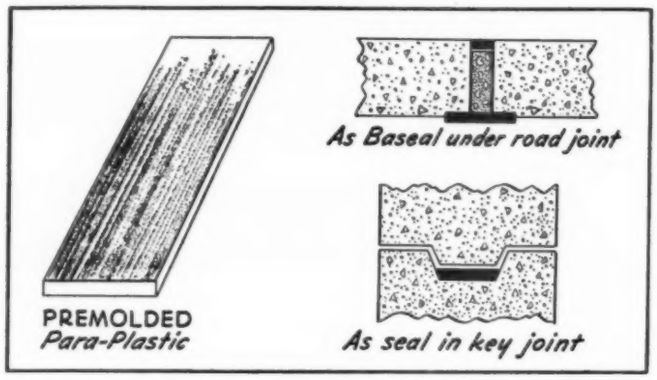
(Reg. U. S. Patent Office)

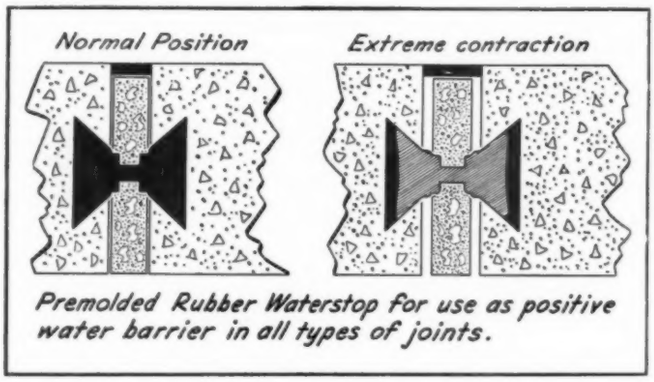
Para-Plastic enables you to meet satisfactorily practically every condition ordinarily encountered in connection with water seal, vapor seal, expansion and contraction in heavy construction—road paving, bridges, dams, reservoirs, spillways, tunnels, sanitary works, airport paving, underground electric terminals.

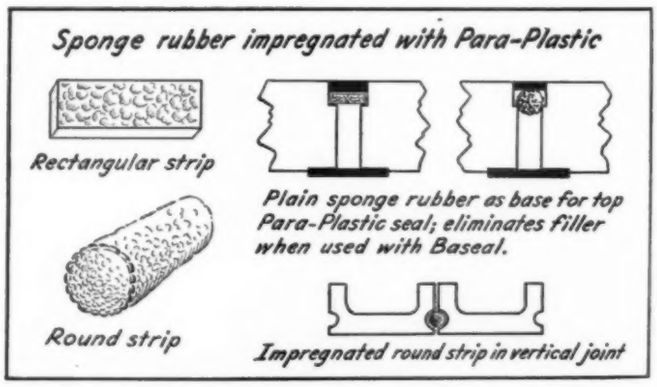
Para-Plastic is a formula containing rubber and other chemicals, with its own particular and distinctive characteristics. It was created specifically because practical construction experience has shown that ordinary asphaltic or tar sealing compounds may fail during certain phases of the expansion and contraction cycles. This experience also clearly showed what characteristics a material must have in order to form a complete water seal all year around, at all temperatures. **Para-Plastic has those characteristics to an exceptional degree.**

It is a rubbery, resilient, adhesive plastic which will adhere to steel, metal, wood, tile, glass, concrete and all forms of masonry. It is cohesive, as well as adhesive, and is therefore self-healing. It will not become brittle or hard at low temperatures from zero to 140° F, and in this range will maintain a positive bond, a continuous seal. **The use of Para-Plastic establishes a new and better art in the protection of expansion and contraction joints against water infiltration.**

Write for literature and complete details on the other Servicised products which have been standard in this field since 1920.







SERVICISED QUALITY PRODUCTS © 1930

SERVICISED PRODUCTS CORP.

6051 West 65th Street, Chicago 38, Ill.

GET THESE 8 BIG ADVANTAGES WITH UNIVERSAL

1. High Output
2. Low cost aggregate to specifications
3. Flexibility for a variety of jobs
4. Rugged dependability
5. Balanced design, anti-friction bearings throughout—smooth, easy running
6. Ready portability
7. Low upkeep and operating cost
8. Nation-wide service

880 Senior with swivel feed conveyor

880 GRAVELMASTER

A complete, compact, high capacity plant with the rugged stability of a permanent installation yet easily and quickly moved to new locations. Unusually smooth and quiet in operation with roller bearings throughout.

GRAVELMASTERS are built in 4 sizes with capacities from 35 to 200 yards of 1″ per hour depending on actual amount of crushing. Each plant features Universal Streamline primary jaw crusher, double roll secondary, and the Universal "Scalping Deck" method of screening—all "Stream-Flo" engineered to assure high capacity with low operating and maintenance costs. Highly flexible, Universal *GRAVELMASTERS* are used as complete gravel crushing, screening, and loading plants or to step up production as secondaries following a primary in either pit or quarry operations.

WRITE FOR BULLETIN No. 39AB

FOR PRODUCTION AT A COST THAT LEAVES MORE PROFIT

Universal "Stream-Flo" Engineering provides the perfect balance of high capacity units to assure steady flow of properly graded material. No starving, no glutting . . . results in more yards per hour at less cost per yard.

Let Universal Engineers recommend the equipment best suited to your crushing, screening, washing, and loading requirements.

WRITE OR WIRE TODAY

PORTABLE WASHING PLANT

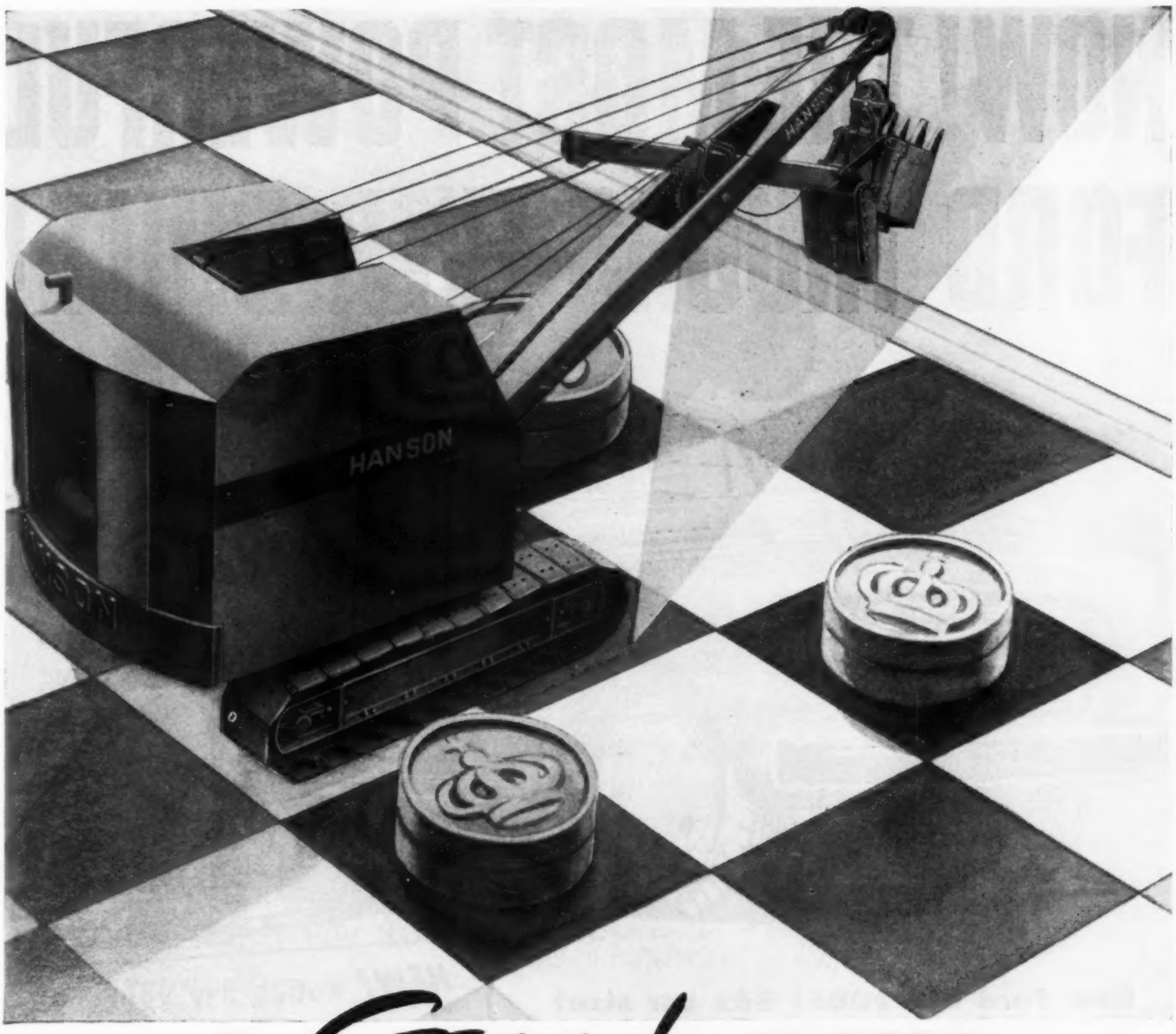
• *An ideal auxiliary for the* GRAVELMASTER. *Produces washed gravel in 2, 3, or 4 sizes. Consists of revolving scrubber, Eagle single screw washer with flared tub, double deck gyrating screen with ball tray, power, and all chutes and water connections. Mounted on pneumatic tired truck.*

You can produce Faster, Better, for Less . . . with UNIVERSAL

UNIVERSAL ENGINEERING CORPORATION

631 C AVENUE N. W. • CEDAR RAPIDS, IOWA

DESIGNERS AND BUILDERS OF "STREAM-FLO" ROCK, GRAVEL, AND LIME PLANTS, SCREENING AND WASHING PLANTS—CONVEYORS—APRON FEEDERS



A *Good* MOVE

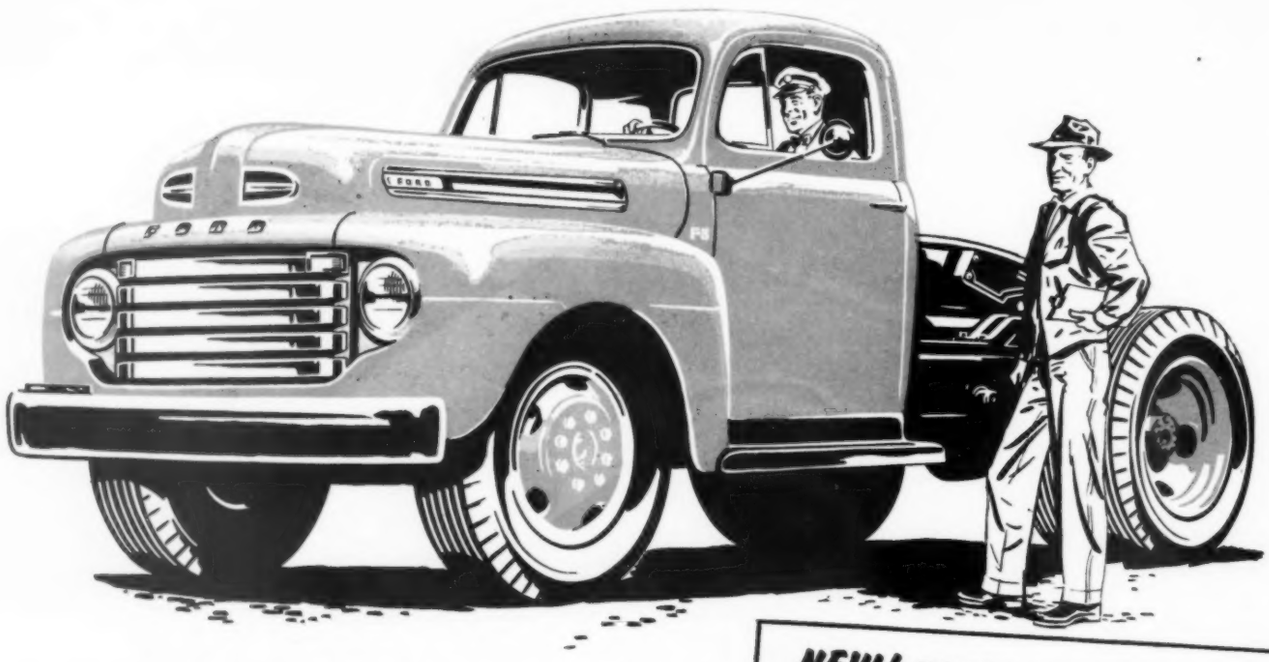
Buy a HANSON! - - - always a good move. Pound for pound, horsepower for horsepower, you can do more work, at lower cost, with one of these popular, HANSON shovels.

Check these features of HANSON: Full revolving chain crowd air controlled steering all-welded steel construction disc-type clutches on swing, internal expansion booster type clutches on hoist and crowd all clutches easily adjusted or relined without removing shaft assemblies extra long crawlers and low center of gravity. *Speedy — versatile — rugged!* *3/8 and 1/2 yard sizes.*

BETTER ROADS FOR A BETTER WORLD · 45th Annual Convention and Road Show · SOLDIER FIELD CHICAGO · JULY 16-24, 1948

HANSON CLUTCH AND MACHINERY CO.
TIFFIN, OHIO

NOW! THE MOST POWERFUL FORD TRUCKS EVER BUILT!



New Ford BIG JOBS! Box car size! Up to 48% higher weight ratings than previous biggest Ford Trucks!

New Ford *Bonus* Built* BIG JOBS rated for up to 37,000 lbs. Gross Train Weight and 21,500 lbs. Gross Vehicle Weight give you the "freshest" thinking in big-truck engineering.

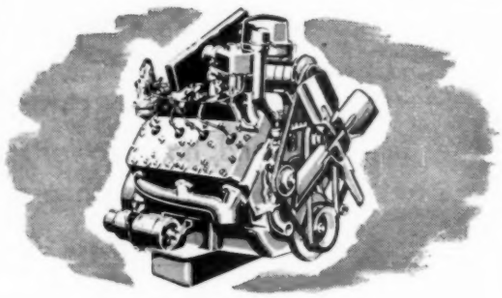
It's down-to-earth engineering, too, backed by over 30 years of truck building experience. The new BIG JOBS are as fit-for-the-job as the world's greatest truck know-how can make them. Ford truck know-how is unequalled because no other truck builder has built as many trucks.

Owing no allegiance to outdated big-truck design formulas, Ford Truck engineers designed an original creation offering a new 145 h.p. V-8 engine . . . up to 10.00-20 tires . . . up to 16-in. by 5-in. rear brakes . . . 5-speed transmission . . . and extra heavy duty construction throughout.

See the new Ford BIG JOBS which head a lineup of over 139 new *Bonus* Built* models. Visit your Ford Dealer today!

***BONUS:** *"Something given in addition to what is usual or strictly due."— Webster*

NEW! ROUGE 337 TRUCK V-8



145 HORSEPOWER
255 LBS.-FT. TORQUE

Most powerful engine ever offered in a Ford Truck! 337 cu. in. displacement. 4-ring aluminum alloy pistons with top ring porous-chrome-plated for better lubrication, long bore life. Hydraulic valve lifters to maintain zero-lash valve adjustment automatically. Exhaust valves faced with hard cobalt-chrome alloy. Dual throat concentric carburetor, correct metering at all operating angles and integral vacuum-type governor. New Loadomatic ignition.

Listen to the Ford Theater, Sunday Afternoons, NBC network. See your newspaper for time and station.

FORD 1948 — *Bonus Built* — TRUCKS 1958

BUILT STRONGER TO LAST LONGER

LIFE INSURANCE EXPERTS PROVE AND CERTIFY...FORD TRUCKS LAST UP TO 19.6% LONGER!

TRENCH HOE

BACKFILLING

CAPACITY* for profitable operation

MOLES PAW

Exclusive with the Schield Bantam, this patented moles paw interchanges with the trench hoe bucket. It will work in sticky or mucky material where the conventional bucket will not operate.

THE 1/3 YARD SCHIELD BANTAM

TRUCK MOUNTED: POWER SHOVEL • TRENCH HOE DRAGLINE • CLAM • PILEDRIVER • CRANE

6 MACHINES IN ONE—the Schield ⅓ yard BANTAM is ready for a wide variety of operations on short notice. In a matter of minutes it's a shovel, trench hoe, clam, dragline, piledriver or crane. Travels at normal truck speeds—drives right up to the job and digs in. On the job or between jobs, you'll save time with the BANTAM.

Ideal for sewer and water systems, trenching, new home construction, street and highway maintenance, drainage work, etc. Full circle design, interchangeable booms and buckets give the BANTAM unequalled versatility. In tight spots it's a star performer.

Write for Complete Details

BANTAM CONSTRUCTION FEATURES

- Gears protected from dirt and grit for longer life
- Ball bearings on all major assemblies
- Fast cycle operation piles up yardage
- High strength alloy construction
- Mechanical internal expanding drum clutches
- Split type laggings assure proper line speeds
- Roomy cab with maximum comfort for operator

*Under normal conditions per hour: trench hoe—100 feet of 5 foot ditch; shovel or dragline—60 yards.

DRAGLINE ON HALF TRACKS

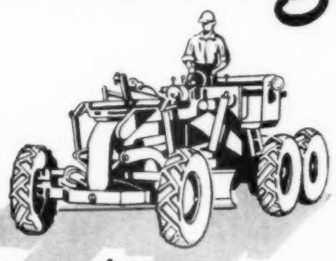
THE SCHIELD BANTAM CO., INC.

203 Park Street **Waverly, Iowa**

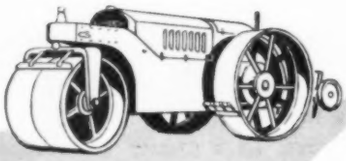
Sold and Serviced by

LEADING CONSTRUCTION EQUIPMENT DISTRIBUTORS

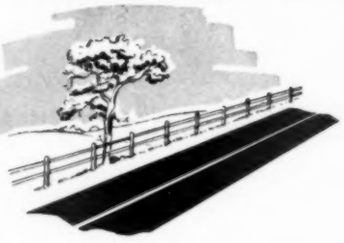
Now Available!....Improved STANDARD ROAD OILS – with these advantages: better wetting or coating of aggregate,



greater stickiness and binding quality,



faster setting, blacker appearance.



You'll get longer-lasting, all-weather surfaces for secondary roads

with.....

STANDARD OIL ROAD OILS

Ask a Standard Oil Asphalt Representative for all the facts about this improved road oil. Write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)

STANDARD

TRAXCAVATORS Give You MORE of Everything

MORE WORK . . . MORE UTILITY . . . MORE PROFITS

You get more for your equipment dollar with TRAXCAVATORS doing all your digging, loading, carrying and grading work — they have the extra stamina and speed that gets more work done in less time and produces more profits on more jobs. Whether they're excavating basements, grading housing sites or loading trucks with bulk material, TRAXCAVATORS give you maximum efficiency and unlimited versatility at all times — the ability to handle any assignment under the toughest conditions.

TRAXCAVATORS are built in sizes to fit every job and purpose — with bucket capacities from ½ to 2½ cubic yards. Every TRAXCAVATOR is engineered to match the power and speed of the rugged "Caterpillar" track-type tractor on which it's mounted. Bulldozer Blade and ANGLEGRADER attachments are also available to further increase TRAXCAVATOR's usefulness. Call on your TRACKSON-"Caterpillar" dealer for complete details or write to the TRACKSON COMPANY, Dept. RS-58, Milwaukee 1, Wis.

TRAXCAVATOR

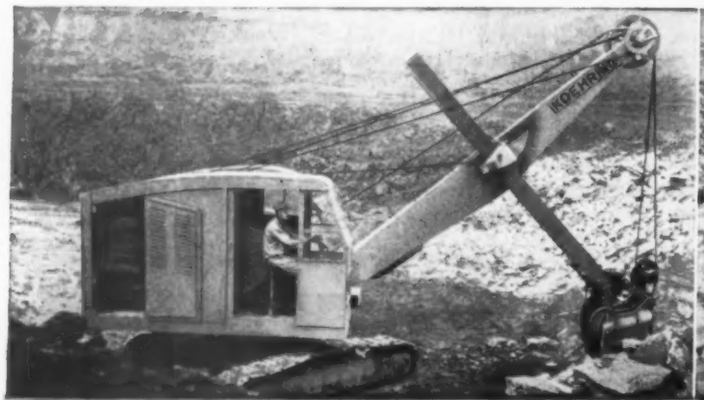
REG. U. S. PAT. OFF.

The Original Tractor Excavator

KOEHRING DUMPTOR

No body hoist trouble . . . extra yardage every shift

KOEHRING SHOVELS keep up with DUMPTOR SPEED



Koehring 304 (¾ yard) Rock Shovel: Heavy Duty leader in ¾ yard class. Enclosed gears run in continuous oil bath

Koehring 605 (1⅛ yard) Rock Shovel: Exclusive power clutch eliminates operator fatigue. Boom-foot shock absorber permits greater speed in rock.

DUMPS IN 1 SECOND

Pull the release lever and gravity instantly tips the scoop-shaped body 90 degrees. One second later, load is dumped . . . you're ready to go for another load.

You don't waste 10 seconds, 20 seconds, 60 seconds. Kick-out pan keeps body clean in any material.

Because Dumptor has no body hoist, you have no body hoist trouble. Dumps fast even in zero weather. Saves all body hoist maintenance expense.

NO TURN-TIME, MORE HAUL-TIME

You save more seconds every trip, because Dumptor never turns on shuttle hauls. Three reverse speeds are just as fast as three forward speeds. Constant mesh transmission is especially designed for shuttle work.

DRIVE AXLE STANDS UP UNDER SHOVEL LOADING:

Dumptor is built by a shovel manufacturer for work with rock shovels. Drive axle is 4" chrome nickel steel, heat treated. Steel case protects entire assembly. Welded steel body is heavily reinforced. Steering axle oscillates to absorb frame twisting shocks of haul road travel.

EASIEST TO MAINTAIN

Everything accessible. One man can do complete grease job in 5 minutes. Clutch removed in fraction of time it takes to remove a conventional clutch, because engine is not moved, transmission case is not touched. Every gear in transmission is removable through one cover.

YOU'LL NEED FEWER UNITS — IF THEY'RE DUMPTORS

Job studies prove 3 6-yard Dumptors can easily handle shovel output formerly requiring 4 other 6-yard hauling units. Generally, there is a saving of 20 to 25 per cent in number of units on jobs within Dumptor range of haul.

Experienced Dumptor engineers are ready to survey your off-the-highway haul problems.

Contact your Koehring Distributor today.

KOEHRING HEAVY DUTY

NO BODY HOIST TROUBLE
because Dumptor has no body hoist. Gravity tips body instantly, returns it automatically when empty.

KOEHRING COMPANY, Milwaukee 10, Wisconsin
Subsidiaries: JOHNSON • KWIK-MIX • PARSONS


Preformed . . .
Preformed wire rope extends its influence far across the whole industrial world.
Because each of its components is preformed to its ultimate form, preformed wire rope is comparatively stress-free. It can work with all its strength — longer. Ask your own wire rope manufacturer or distributor for Preformed.
Write to the Preformed Wire Rope Information Bureau, 520 N. Michigan Avenue, Chicago 11, for an illustrated booklet telling the complete story of Preformed Wire Rope.

NEW Thor BACKFILL TAMPERS

NEW POWER FOR FASTER WORK

NEW STREAMLINED DESIGN
EASIER HANDLING

Just open the valve . . . the new Thor Backfill Tamper will pound more dirt into the hole than you can shovel out of it!

Even the stiffest backfill is pounded solid—*quickly*, with the rapid, powerful blow of this new Thor . . . with a minimum of lifting by the operator. New plate valve and enlarged air ports deliver maximum power under varying air line pressure. Automatic lubrication. Positive-lock butt. Positive air seal.

Call your Thor dealer for a demonstration, or write for circular.

ACCESSORIES

For top efficiency, always specify Thor hose, couplings and clamps.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois
Export Division: 330 West 42nd St., New York 18, N. Y.

Birmingham	Boston	Buffalo	Cincinnati	Cleveland	Denver	Detroit	Houston
Los Angeles	Milwaukee	New York	Philadelphia	Pittsburgh	St. Louis	St. Paul	
Salt Lake City	Seattle	San Francisco	Toronto, Canada	Sao Paulo, Brazil	London, England		

Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

THE INSIDE STORY OF OUTSTANDING PERFORMANCE

Years of Planning, Testing, Proving and Training Behind A-C Equipment

TORTURE TESTED

...at Proving Grounds

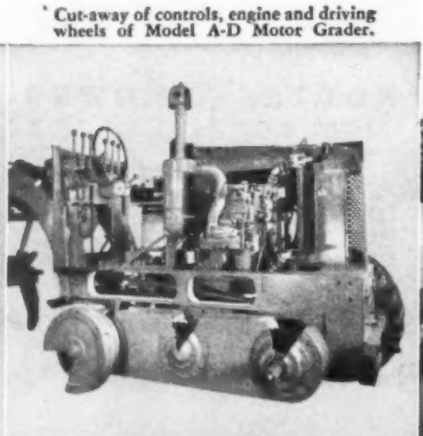
After long research and engineering, Allis-Chalmers and Allied experimental models are built and sent through the most gruelling grind on our Proving Grounds that can be conceived. They operate 24 hours a day on all types of tests . . . in mud, sand, rock and gravel. Tractors are driven at high speed over staggered railroad ties — really torture tested!

...in the Field

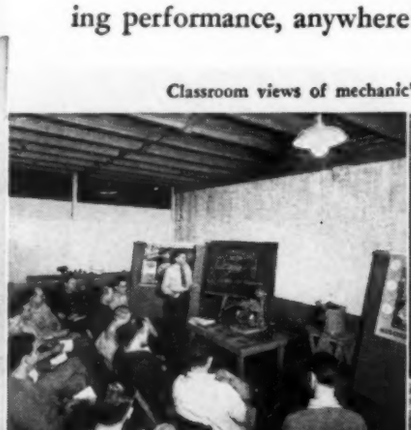
After they prove their ability on the Proving Grounds they are sent into the field. Here they are tested under a variety of conditions, on every type of job . . . the toughest in the country! The contractor's own operators put them through their paces. A-C field engineers constantly check and study their performance . . . movies are made for further observation. When they are put into production they are ready . . . ready to give outstanding performance, anywhere!

Interior view of one of the Educational Trucks.

Cut-away of controls, engine and driving wheels of Model A-D Motor Grader.



Classroom views of mechanic's school at Springfield, Ill.



BRUTE FORCE!
Laying cable takes real stamina and staying power — well supplied by the HD-19, Torque Converter Tractor.

BACKED BY SKILLED SERVICE

Factory-Trained Mechanics
Schools for dealer mechanics are in constant session at our factory in Springfield, Ill. Courses combine lectures with laboratory work. Equipment is torn down and put back together. Cut-away views show assemblies in operating position and in operation.

Industrial Educational Trucks
Here is education on wheels for entire dealer personnel. These trucks travel about the country — from one dealer to another — carry cut-aways of principal assemblies and teardown engines.

Home Office Service
Highly-skilled factory servicemen are available to dealers for advice and assistance. Service Manuals and Instruction Books prepared by this department give you and the dealer detailed information on servicing and operating Allis-Chalmers machines.

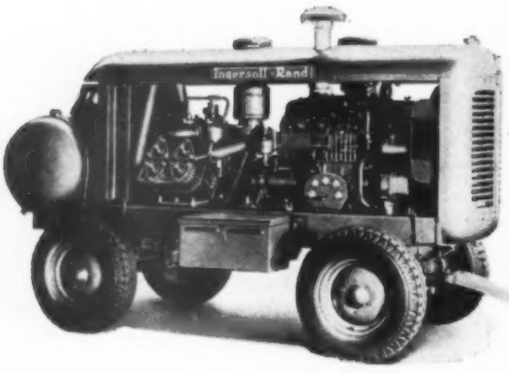
Allis-Chalmers Parts
Complete stocks of replacement parts — made in same factory, to same specifications as original parts — are carried by your A-C dealer.

Matched Line of Allied Equipment
It is designed and built in cooperation with A-C . . . undergoes same rigid tests . . . and is sold and serviced through A-C dealers.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.
Originator Of The Torque Converter Tractor

BETTER ROADS FOR A BETTER WORLD
45th Annual Convention and Road Show
SOLDIER FIELD CHICAGO
JULY 16-24, 1948

GET FULL PRESSURE AT THE AIR TOOL



Keep compressor *valves clean.* Lubricate with Texaco.

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TUNE IN . . . TEXACO STAR THEATER every Wednesday night featuring Gordon MacRae and Evelyn Knight . . . ABC Network.

Vecellio & Grogan's 9.3-mile 900,000 c.y. job near Beckley, W. Va.

ROADS AND STREETS

MAY, 1948 • VOL. 91 • No. 5

Moving 4000 C. Y. Per Day— Mostly Rock

Biggest road contract in West Virginia's history—mostly rock—averaged 4,000 c. y. per day

PROJECT: 9.3 mile relocation on Welch-Pineville section of Route 16 Wyoming County, W. Va. (FAS 68(2). Clearing, grubbing, drainage, grading, traffic-bound stone base 6 in. thick x 18 ft. wide. Contract price, $847,338. Awarded June 25, and work begun July 8, 1946. Completed Oct. 7, 1947.

Personnel: General manager, Leo Vecellio, partner of Vecellio & Grogan. Superintendents on grading and stone work, J. F. Scites and F. E. Weeks; concrete work, Floyd Vecellio; carpenter foreman, Ray Martin; master mechanic, Robert Taylor; engineer, Joe L. Barrett, timekeeper, Vermal Curry; resident engineer, A. S. Blankenship; inspector, Fred Bailey.

Job Features: Largest single contract ever awarded to one contractor by the State Road Commission of West Virginia. Job contained deep-

★ Pioneer roads are necessary to start deep cut. Haul road under construction

est and largest highway cut in West Virginia—187 ft. deep with over 300,000 c. y. of material removed. Fills on either side of cut contained 200,000 and 80,000 c. y., respectively. A 1½-mile section of the work contained approximately 500,000 c. y. excavation. The job consisted of 65% material that had to be blasted, comprising grey sandstone, hard shale and rotten brown sandstone. 300,000 lb. of explosives used. 205,581 gal. of petroleum products. 254,966 man-hours of work required to do the job.

Misc. Quantities: 900,000 c. y. unclassified excavation; 150 acres clearing; 10,000 c. y. structure excavation; 2,500 c. y. concrete; 30,000 tons stone base; 8,950 l. f. culvert pipe; 200,000 lb. reinf. steel.

Equipment: Outfit used consisted of major units as shown in the accompanying table:

★ Looking into the big cut area. Fill started after clearing and grubbing all stump

Shovels

1 Northwest model 80-D 2½-yd.
1 Lorain model 80 1¾-yd.

★ Sturdy equipment is needed to dig and haul the blasted rock. Tire equipment is subject to rough going; is checked daily at the shop

1 Northwest model 6 1½-yd.
1 Lorain model 77 1½-yd.
1 Northwest model 25¾-yd.
1 Michigan truck shovel and crane ⅜-yd.

Hauling and Earth-moving

3 Caterpillar D8 tractors with LeTourneau angledozers
3 Caterpillar D7 tractors with LeTourneau bulldozers
1 Caterpillar D6 tractor with LaPlant-Choate angledozer
5 Caterpillar D8 tractors used with 2 Athey 16-yd. crawler wagons, 2 LaPlant-Choate 16-yd. scrapers and 1 LeTourneau 15-yd. scraper.
5 Caterpillars D7 tractors used with 3 Athey 14-yd. crawler wagons and, 2 LeTourneau 11-yd. scrapers.
5 Euclid rear dump trucks 12-yd.
2 LeTourneau Super C Tournapulls. LeTourneau scrapers removed and Tournatrailers installed Nov. 25, 1946.
1 LeTourneau H3 rooter
2 Sterling dump trucks 6-yd.
6 1½-ton Ford dump trucks

★ Varied equipment used. One section of the rock cut shown. Note how contractor cleans up loose material and maintains smooth haul roads

Drilling

1 Gardner-Denver 500 cfm. diesel compressor
5 Gardner-Denver 365 cfm. diesel compressors
1 Gardner-Denver 210 cfm. diesel compressor
1 Ingersoll-Rand 105 cfm. truck-mounted air compressor
1 Hardscog horizontal drill
16 Gardner-Denver jackhammers 55# class
6 Gardner-Denver D99D wagon drills

Crushing

1 Cedar Rapids 2-unit portable crushing plant. Gasoline-powered. 18" x 36" jaw crusher. 40 tons per hr.

Concrete Work

1 Koehring 16S mixer
1 Jaeger 16S mixer
1 Rex 14S mixer
3 wheelbarrow scales
1 Beach saw rig-gasoline driven
1 4" centrifugal pump
2 3" centrifugal pumps
3 2" centrifugal pumps
2 1" centrifugal pumps
1 Mall vibrator
2 1-yd. concrete buckets
12 Rubber-tired wheelbarrows
1 1½-ton Chevrolet truck

Other Equipment

4 1-ton pickups
1 Jeep
1 Caterpillar #112 motor patrol grader

2 16-ton 3-wheel rollers
2 1½-ton trucks mounted with gasoline-driven 350 amp. electric welders
1 1½-ton wrecker service truck
1 10-ton Federal diesel truck tractor
1 25-ton Jahn equipment trailer
1 Chevrolet 1½-ton truck equipped with Alemite heavy-duty portable greasing and oiling unit
1 Caterpillar #12 patrol grader

Repair Facilities: The contractors' home shop is located in Beckley, W. Va., 45 miles from the project. The shop contains lathes, drill presses, five-ton travelling crane, 100-ton hydraulic press, valve refacers and reseaters, grinders, electric and acetylene welding outfits, air compressor, blacksmith shop, tire-repair facilities, spare parts storage, paint shop, steam cleaning unit and equipment storage. This shop is capable of performing any major overhaul job on the equipment, and is also capable of making shafts and some parts that are hard to get. The main use of the shop is to repair equipment after completion of the jobs, and the equipment is hauled in to the home shop by the contractor's trailer outfit.

The contractors' field repair shop, spotted in the center of the project, is housed in a 50 ft. x 30 ft. wood-frame building covered with composition paper.

Following notes were made during progress of the work: The shop is located near the supply and parts house, the field office and fuel storage. Electric power for the shop is furnished by two 1½ KW Delco plants. In this field shop, major overhauls are made on all the equipment requiring it.

The equipment in the field shop consists of: 2 pneumatic riveting hammers, 100-ton hydraulic press, acetylene and electric welding units, bench grinders, 50-ton hydraulic jacks and smaller, electric drills, heavy-duty sockets up to 3 in., and special manufacturers' tools for repair of equipment.

Jobs done in the field shop consist of: complete overhaul of tractors including motor, transmission, final drive, tracks and power units; overhaul of shovel buckets; and any type of welding on scrapers or other equipment. Breakdowns that require two or three days to fix up are usually repaired at the scene of work. Breakdowns that require a major overhaul or will take more than three days are hauled into the field shop by the contractor's trailer outfit. Two mechanics with helpers comprise the personnel in the shop.

For repairs at the scene of work the contractor has two 1½-ton trucks mounted with electric welders, acetylene welding outfit, all types of tools, jacks, chains, bars, etc. Each truck has a mechanic and a helper. These men travel to any piece of equipment that is down and repair it on the spot or get it in shape so that it can be loaded on the trailer and sent to the field shop. The mechanics also have a jeep at their disposal to make minor repairs to drills, etc.

The contractor relies on his own organization and personnel to do over 95% of his repair work. Some castings that require machining and are too large for contractors' repair facilities are sent to commercial shops.

Bid Items—Welch-Pineville Road, Project S68 (2), West Virginia

Consists of 9.332 miles grade, drain, traffic-bound base, structures, as described in accompanying article. Bids June 11, 1946, total as follows: (1) Vecellio & Grogan, Beckley, W. Va., $847,388.50; (2) A. S. Wikstrom, Bound Brook, N. J., $1,328,640.50; (3) Smith Const. Co., Huntington, W. Va., $968,638; (4) Keeley Const. Co., Clarksburg, W. Va., $914,069.50. Details below:

Item	Quantity	(1)	(2)	(3)	(4)
Acres clearing and grubbing	150	$ 200.00	$ 300.00	$ 300.00	$ 150.00
C.Y. unclassified excav.	791,400	.64	1.10	.65	.70
C.Y. borrow excav.	22,400	.64	.80	.65	.40
Sta. y. overhaul	800,000	.005	.01	.01	.01
C.Y. excav. for struct. traffic bound base course	10,000	2.75	4.00	4.00	3.50
Ton aggr. stone (crusher run) 18" C.M.P. paved invert	27,000	3.25	4.00	4.00	3.40
L.F. or asph. coated (partially coated) 24" cmp paved invert or	430	2.85	3.25	4.00	2.50
L.F. asph. coated (partially coated) 30" cmp paved invert or (10 ga.)	520	4.75	5.00	5.00	3.50
L.F. asph. coated (partially coated) 36" cmp paved invert or	530	9.00	10.00	9.00	7.00
L.F. asph. coated (part. coat.) 8 ga. 42" cmp paved invert or asph.	900	11.50	14.00	12.00	10.00
L.F. coat. (part. coated)	84	12.00	14.25	14.00	9.00
L.F. 18" rcp std. stgth.	5,200	2.75	3.50	4.00	2.50
L.F. 24" rcp std. stgth.	820	4.75	5.25	5.00	3.50
L.F. 36" rcp std. stgth.	144	8.00	10.00	10.00	7.00
L.F. 42" rcp std. stgth.	94	10.00	11.50	12.00	9.00
L.F. 60" cmp (sectional)	180	30.00	35.00	40.00	25.00
L.F. relaid pipe	44	2.00	2.50	1.00	1.00
C.Y. class A. conc.	1,180	38.00	43.00	45.00	38.00
C.Y. class B conc.	1,370	34.00	46.00	44.00	35.00
L.F. conc. handrail	169	7.00	7.50	10.00	7.00
Lbs. reinf. steel	207,000	.07	.09	.10	.07
S.Y. paint coat waterproof	2,510	1.50	1.75	2.00	1.25
L.S. steel super struct. (66,000#)	1	6,000.00	7,000.00	7,000.00	9,000.00
L.F. 8" cmp (perf.) crushed stone of gravel	1,000	1.25	1.25	1.50	1.00
C.Y. for underdrains	200	5.00	6.50	5.00	6.00
C.Y. special rock fill	15,800	.75	2.25	2.00	2.00
L.S. removal of bridge (sta. 347125)	1	750.00	1,500.00	1,000.00	800.00

House Passes Federal-Aid Highway Measure

The House recently passed the Federal-aid highway bill (H.R. 5888), which authorizes appropriations for continuing the postwar construction of highways, by a vote of 276 to 6.

This legislation provides for a 3-year program of $500,000,000 annually for the fiscal years 1950, 1951 and 1952. These appropriations will be distributed on the basis of 45% to projects on the Federal-aid highway system; 30% to rural roads and 25% to urban projects. The new measure also calls for a grace period for expenditures of funds of three years in lieu of the two years provided for under the present law. Language has also been broadened to include township roads.

Other special appropriations, not included in the $500,000,000 are provided for forest, park and Indian reservation roads. These total $57,750,000 for each of the fiscal years 1950, 1951 and 1952.

H.R. 5888 will now be referred to the Senate Public Works Committee for consideration. Inasmuch as hearings have not as yet been officially closed on the Senate highway bills, there is now a question as to whether this committee will report out their own bill or consider the House measure.

1949 Meetings ASCE

Places for the 1949 quarterly meetings of the American Society of Civil Engineers have been announced by Col. William N. Carey, Executive Secretary. Meetings were announced as follows: Annual meeting, New York —January; spring meeting, Oklahoma City—April; summer convention, Mexico City—July; fall meeting, Washington, D. C.—October. While exact dates have not been set, the meetings will be held about the middle of the above-named months.

EDITORIAL

★ Sheepsfoot Rollers Need Standardizing

One of the most important equipment needs spotlighted at the American Road Builders-Highway Research Board Conference in San Francisco is the need to standardize sheepsfoot roller design. Manufacturers of rollers are plagued with such a multiplicity of specifications that they practically have to tailor-make every unit that goes out of their plants. As a result, a type of a unit that in essence is simplicity itself and ideal for economical mass production, costs far too much to make. Some makers have virtually thrown up their hands and turned to other more profitable items in their factories.

The situation was summed up very well by one equipment manufacturer present. Suggesting that the sheepsfoot is an ideal place to begin equipment simplification, he observed that hardly two state highway departments specify alike on embankment and grade compaction as far as such rollers are concerned. On top of that, noted other observers, the U.S. Engineers, Reclamation Bureau and other large agencies each have their own special requirements, often differing only in some little technicality.

A sheepsfoot roller is simply a drum with punching feet. Yet in the two or three decades since its use has come to the fore, engineers have gone crazy thinking up exclusive ideas as to the proper number of feet, area of foot surface, length of feet, spacing of feet, total roller weight, unit weight of feet, etc. Furthermore they've concocted several ways of computing unit weight. Wyoming's specification, for example, is a tricky one, 'tis said, with feet details so worded that a contractor, if so minded, could meet literal requirements yet still get by with a roller totally inadequate in size and weight.

Unnecessarily high purchase cost to the contractor due to lack of factory standardization is bad enough, but even more costly to the ultimate taxpayer on road work is the need for the contractor to have numerous rollers lying around. A contractor who bids on work in two states plus federal projects, for example, has to do some fancy swapping or else wind up with a yard full of rollers.

An engineer with the California division of highways pointed out that highway departments often have unwittingly encouraged too wide a variety in rollers by writing specifications broadly so as to avoid unjust ruling out of any one maker's product.

Some projects don't need, and in fact shouldn't have, sheepsfoot rollers at all, one engineer reminded. Specifications should not say that all soils shall be rolled with sheepsfoot rollers.

Manufacturers have been unjustly accused of being the chief cause of this lack of standardization. While individually some of them are plugging one tooth or drawbar refinement or another, collectively they would welcome a chance to cut down on models. And it would certainly cut down dealer inventories. It was suggested at the conference that three or even just two basic sizes would serve the needs of a wide variety of jobs. One suggestion was to include only a heavy roller for dams, a medium general-purpose roller for highway work, and a smaller one for small or light jobs.

Another suggestion was to hold to two rollers for highway work—a 300-350 "light" unit and a 350-500 "heavy" unit. With two such standard units, special rollers for unit weights above or below these brackets then would need to be made in smaller volume.

In short, roller manufacturers are seemingly ready to cooperate, but the starting point toward simplification is not on the assembly line or even in the specific specification clause pertaining to rolling. General compaction requirements and test methods need standardization. ROADS AND STREETS not long back (April '47) published a detailed summary of the 48 bewilderingly varied state highway specifications on density or compaction. The situation hasn't improved much to date.

If soils and design engineers can't get together, how can the manufacturers be expected to?

San Francisco Soils and Equipment Conference

Lively, well-attended meeting shows need for contractors, engineers and equipment men to get together more often on mutual problems

IT had a long name—the Western States Conference on Compaction of Soils and Development and Use of Highway Construction Equipment.

It was held April 8-9 at the Whitcomb in San Francisco, jointly sponsored by technical committees of the Highway Research Board and the American Road Builders' Association.

And if you are a westerner, you should have been there! Some 250 delegates were present from western highway and street departments, the U.S. Engineers, Public Roads Administration, machinery manufacturers and distributors, and—lo and behold—some contractor organizations. Not enough contractors sent their engineers or attended in person; however, those who did attend, contributed many worthwhile ideas.

Clemmer was Sparkplug

This meeting is the fourth of its kind staged in the past 2½ years, under the generalship of Harold F. Clemmer, who is general chairman, committee on development of highway construction equipment of ARBA. He opened the first session with a reminder that while neither ARBA nor HRB is a specification writing body, he expected specification ideas to come out. [ARBA now has some 30 technical committees of which Mr. Clemmer is the coordinator, and through them issues much valuable correlated information in the form of printed reports, on subjects which no other organization is set up to cover. Ed.]

Soil Compaction Problems

An all-morning forum on compaction of soils was led jointly by Earl F. Bennett, principal soils engineer, New York state, and Lyman D. Wilbur, chief engineer, Morrison-Knudsen Company, Inc., of Boise. The practice of rolling fills, which began in the West and spread eastward, now is underging new changes in concept, Bennett noted. Results obtained from compactive effort, rather than moisture-density and other technical considerations, is the main concern of the contractor, he reminded. Any test procedure used by the engineer is satisfactory as long as it fits the soil and enables the contractor to do good work.

On the engineering or specifier side, Bennett further laid the platform for discussion by observing that the purpose of compaction is to help achieve a given total result at reasonable cost. High compaction may or may not be the most economical way to get a structure with a given traffic load capacity; efforts to obtain high compaction may unnecessarily prolong the job due to season or climate, and the economic benefits be lost. Ordinarily however, compaction is now becoming accepted as a cheap means of getting load bearing value in a roadbed. A satisfactory foundation is the first requisite for a road, dam or airfield.

Four Soil Types

As an example of the varied problems faced in the field, Bennett described four typical soils often encountered:

(A) Free draining soils, which enable everyone to get along fine.

(B) Quaky soils, which may get that way when compacted under standard rolling procedure or under passage of heavy equipment. Usually found in valleys, accompanied by a high water table and moisture content.

(C) Soils such as plastic lake clays which lose strength when remolded. Critical as to moisture.

(D) Expansive soils which may be compacted and made highly stable during the construction season, but which will expand and become less dense and raise up the pavement later on. High compactive effort not permissible.

Further opening the meeting for discussion, Mr. Wilbur on behalf of contractors observed that engineers like to write specifications to protect their agency, and that a contractor virtually signs a contract "against himself." Claims, lawsuits and wrangles will be lessened as specifications are changed to bear more heavily on the end result and less on procedure, he said.

"Within the lifetime of most of us," noted Mr. Wilbur, "we've seen fill building progress from horse-drawn vehicles, which performed little compaction. As time progressed contractors had a tendency to resent new specifications imposed. Now we've come to see the need for the effort and expense to get better fills and subgrades." With particular reference to such extremely heavy runway designs as that at Fairfield-Suisun Airport, California, this speaker noted the gradual increase in roller weights, culminating in the 200-ton Porter roller used at Baltimore Airport. Contractors and specifiers must make the best use of spiked, smooth and pneu-

★ Conference scene, with Earl Withycombe, Calif. construction engineer, discussing a point

★ Lyman D. Wilbur, chief engineer, Morrison-Knudsen Company, Inc., who was co-chairman of the soils compaction session. E. A. Willis, senior highway engineer, Public Roads Administration, Washington, D. C., and Earl Campbell of the Highway Research Board technical staff, speakers at the conference. C. W. Bros of Wm. Bros Boiler & Mfg. Co., Minneapolis. A. J. Weyner, project engineer, San Francisco municipal airport, and E. S. Jennison, pres. Johnson Machinery Co.

matic rollers, and utilize the compactive effect of the bigger trucks and earth-moving equipment.

Specifications Still Imperfect

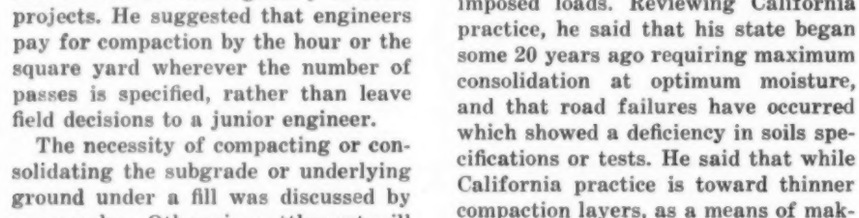
Opening up an old subject between engineers and contractors, Mr. Wilbur gave as his biggest quarrel with specification writers and inspectors the fact that they impose requirements as to kind of equipment and number of passes, as well as end results. Noting that earth-moving costs have trended lower in relation to other construction costs, due to equipment developments, he ventured that contractors could achieve still lower costs if left to their own ingenuity on some projects. He suggested that engineers pay for compaction by the hour or the square yard wherever the number of passes is specified, rather than leave field decisions to a junior engineer.

The necessity of compacting or consolidating the subgrade or underlying ground under a fill was discussed by one speaker. Otherwise settlement will occur. Sand drains and other procedures have come into the fore recently in recognition of this problem, and engineers now give more routine thought to the load that the ground under a fill can carry.

Compaction Economics

Arbitrary compaction ideas were criticized in this meeting, one speaker noting that sometimes on dam projects the engineer tries to get the ultimate compaction without regard to economic considerations. Sometimes a dam of given safety and stability can be obtained more cheaply by changing its cross-section and volume. Overly severe or rigid requirements as to moisture control, also, sometimes greatly increase the cost of an earth structure, to the point where a different design with less rigid compaction requirements might have saved money; aerating of cuts and fills is a costly and delaying procedure.

T. E. Stanton, materials and research engineer, California division of highways, agreed with most of the foregoing discussion. He warned that the original ground must be tested to see if it will support intended superimposed loads. Reviewing California practice, he said that his state began some 20 years ago requiring maximum consolidation at optimum moisture, and that road failures have occurred which showed a deficiency in soils specifications or tests. He said that while California practice is toward thinner compaction layers, as a means of making best use of available equipment, the ultimate answer may be thicker layers with new or heavier equipment. Layer thickness is always specified today, consisting of 6 in. immediately under the pavement and thicker layers on down in deeper fills. California specifications require an end result, he said, but his organization has found that control over procedure is necessary if the desired result is to be obtained without occasional costly ripping out and reconstruction which will seriously delay the project.



★ Prof. Ben Petty of Purdue University, who represented the Highway Research Board. (Right front is Arthur R. Smith of Chief of Engineer's office, Washington, D.C.)

New Washington Specs

New state highway specifications in Washington were highlighted by Bailey Tremper, materials and research engineer, who said that contractors of his state asked for and are being given payment by the day or hour for rolling. Federal-aid highway reporting requirements complicate the situation, however, and Washington State will continue to limit moisture content to plus or minus 3% of optimum at time of rolling. Added water will be paid for as an item, but not drying. Among other state practices reported, E. B. Bail, materials engineer, New Mexico, said that his state specified 6-in. layers; payment for water and rolling; soil heavier than 120 lb. per cu. ft. compacted to 95%, lighter soil to 90%; and not rolled; principal aim, to achieve a *uniform* fill. Bail said he would settle for 88% or even 85% density if accompanied by uniformity. Rollers were specified at 300 psi. for a while, but sand and water loading of rollers wore out their bearings. Now specifies 200 psi. on roller feet. Such rollers get around more easily, the contractors like them, good results are being obtained, and bids are no higher. Where soils have extremely high optimum moisture content (25% say), the state materials department will settle for a somewhat lower content at time of rolling than theoretically desired.

A delegate from the U.S. Engineers, in summarizing that agency's practice, said that efforts were being continued to develop equipment for compacting thicker layers than now specified. Specifications of the Civil Aeronautics were also reviewed briefly.

Holds Engineers Responsible

Engineers should continue to carry the burden on airfield grading control, was the contrasting point of view of A. J. Weyner, project engineer on San Francisco's new airport. This agency has no standard specification. In the past it has paid for fill in place by the cubic yard, also the square yard. Weyner now believes that the roller-hour is the best unit of payment. O. H. Tucker of Macco Corporation, who superintended a huge yardage of placement on the San Francisco airport Bayshore freeway projects, told of his experience with the fine sandy soil used. His outfit was able to get 90% density without additional rolling other than by the big special heavy off-road equipment. However, they had difficulty obtaining 95%, as required under pavement areas, and seldom could reach this figure until a special 5-tired 100-ton pneumatic roller was put to work. Sheepsfoot rollers were able to pro-

duce only 91 or 92% compaction. Sometimes additional roller-passes actually lowered the density from 92% back to 88%, whereas the heavy air-tired hauling equipment alone frequently produced 98%.

Interesting observations were made by contractor men at this point in the discussion:

1. Engineers like to see sheepsfoot rollers running on the fill, sometimes having a tendency to require them when it takes other types of equipment to really do the job.

2. A contractor may think he has his density, but at that particular moment no testing engineer is around. If roller work was paid for by the hour, the engineer would always be there!

California highway division's viewpoint was expressed by Earl Withycombe, who said that they specify a minimum relative compaction and minimum equipment. This dual specification helps the contractor know what equipment he must put on a job.

Specifying of both minimum equipment and end result in California is deemed wise said another state man, because that state must deal currently with some 526 contractors, on work representing the widest range of soils and climatic conditions. Many "gypos" and newcomers must be kept under control, and experienced contractors as well as the highway department are sold on the dual specification. "When new contractors are allowed to take a chance, experienced ones haven't a chance," noted this engineer.

Vibratory Rollers

Vibratory rollers were shown to be a new tool of potentially great importance. A. W. Davis of Electric Tamper & Equipment Company, spoke of work in conjunction with the Michigan highway department. Surface vibrators were found to be effective on fill layers up to 3 ft. in depth, but the state has tentatively decided on 12-in. layers for this type of equipment. Maximum densities are determined in a laboratory on a vibratory table. In one case cited in Michigan, a bulldozer in 12 passes produced 108 lb. per cu. ft. density, a 150-lb. vibrator 111 lb., and a laboratory control test 112 lb.

Co-chairman Bennett observed that vibratory compaction may be used some day on some plastic soils. It can be specified clearly and with confidence today on granular materials.

When to specify compaction or vibration of sand, was raised and partially answered by Mr. Hahn of CAA. Compaction to considerable depth occurs under plane warm-up areas. "There is no question that we can now require and justifiably pay for a high degree of compaction for sand," said this spokesman.

Advance Soils Cooperation

Bennett further summed up New York procedure by saying that his state requires 90% minimum on embankments and 95% minimum on subgrades to a depth of 4 ft. below grade. Contractors are given all possible information on the soils. The state expects to work closely for a week's time with the contractor on a new job or where new soils are involved, until contractor's men and state inspectors are familiar with the soils and how to deal with them. If heavy hauling will compact the soils, fine! On the other hand, if rollers roll out at 85%, something is wrong, and the problem is restudied. New York state specifications call for smooth rollers and pneumatic and/or sheepsfoot rollers.

Contractors in New York, according to Bennett, considered the number of hours of rolling per unit of fill to be "their business," and state specifications were written accordingly. Inspectors were told to run fewer tests in the shack and do more observing. Admitting that some soils are deceptive, he urged that inspectors and foremen learn to use their eyes and their common sense to the utmost, as a means of getting on with the job.

An important and far-reaching innovation in New York is the greater progress being made in wet weather. Contractors have found that it pays them to get going sooner after rains, and do the necessary extra manipulation, where the character of the soil will permit compaction slightly on the wet side of optimum. "Contractors have found that when we furnish an inspector who can really inspect and observe, he can work more in wet soils. They are with us after one such job," said Bennett.

Field Changes Urged

Sometimes the engineer can also help keep the job going by making changes in the cross-section, as for example okaying placement of a wider gravel base. Also by closer inspector cooperation.

Withycombe of California concurred in this point of view, citing a particular example where a job was about to be shut down due to rubbery conditions until a test revealed that better than 90% was being obtained. The state men no longer invariably gauge the excess moisture by the way heavy equipment operates. He noted a practical difficulty in getting uniform distribution of the path of travel of equipment, saying that supplementary rolling is required for this reason.

Expansive Soils

On expansive soils and the problems they impose a San Diego city representative told of finding no way to deal with adobe except to dig it out and replace it with granular material. A 3 to 4-ft. soil layer over adobe hasn't always prevented heaving of pavement within a year. Mississippi's successful practice of covering an expansive soil layer first with a non-expansive plastic soil, then granular soil, was told. New York state experience has shown that good results with an expansive soil can be achieved by mixing in a corrective soil, but state engineers prefer to seek a "select material" as being less expensive.

The danger of avoiding overstress

★ O. J. Porter, consulting engineer; County Engineer Dudley, Monterey County, Calif.; Wm. Jervis of O. J. Porter & Co. E. L. Venson, Barber-Greene Co., and Earl F. Bennett, principal soils engineer, New York state d. of p. w. Charles and Oscar Frederickson of Frederickson Bros., well-known California road-building contractors

★ Left: R. M. Gillis, assist. state highway engineer, California, with H. H. Stacy, Colorado Fuel & Iron. Right: Conference general chairman Harold F. Clemmer of District of Columbia, and T. E. Stanton, materials and research engineer, California

of soils with heavy rubber-tired equipment was stressed by Co-chairman Bennett. Sometimes a loaded earth wagon will "go through" a compacted fill material, whereas the empty wagon is a safe means of building up the compaction in passage. Some glacial til's must be watched especially for overload, and the loaded units brought in over a haul road. In the past, contractors have had lots of trouble with soils that cannot stand the heavy equipment. Experienced contractors lay off in their bidding on certain projects for this reason. Less experienced contractors often are forced to set their heavy equipment to one side and haul dirt in light trucks.

Hveem of California concluded by saying that everyone should draw a distinction between laboratory density and equipment supporting power of a given soil. The two are not always the same, by a wide range. He offered the suggestion that fills someday be judged on supporting power rather than weight per cubic foot.

Tire pressure on earth-moving equipment was seen to be an important consideration. Pressures as low as 20 to 25 lbs., were urged for some circumstances.

Overstressing of soils also occurs simply with depth, again noted Bennett. There is a certain depth beyond which the "point load" of a scraper tire no longer is the governing factor. A manufacturer's greater range of weight in rolling equipment expected to be available soon, was seen to offer help in equipment selection.

In concluding the half-day session on soil compaction, Co-chairman Bennett stated his belief that contractors should have the right to select the kind of equipment used, depending on soil types. The sheepsfoot, for example, is not practical where big stones are present and layers are over 6 in. thick; hauling equipment does more good. Vibratory equipment will be more and more in demand by contractors as they learn to use it. Heavier sheepsfoot units are needed in certain plastic soils. Each of the four basic soil types imposes different equipment needs, which puts a heavy burden on equipment manufacturers.

Soils procedures must be simplified and standardized, with engineers going the same evolutionary route as they have done with concrete and asphalt paving procedures, said Bennett. As the engineer's grading "product" is standardized, he will become more willing to take a lump-sum bid in payment.

Willis of PRA observed that as a national preference, contractors seem to want to be paid by the hour for rolling, but that engineers prefer not to go all the way but still will require minimum passes to assure uniformity. Co-chairman Wilbur of Morrison-Knudsen, Inc., again urged that roller pass requirements be limited to the smallest minimum. This plus deletion of "or equal" clauses, were named as fundamental improvements generally desired by contractors. Earl Jennett of Guy F. Atkinson Co., San Francisco contracting firm, backed up these remarks, saying that the contractor often throws in a contingency when bidding in an unfamiliar area, and that improved specs would lead to cheaper prices in such instances.

As a final remark, Co-chairman Bennett counseled contractors never to be afraid to go to the highway department soils engineer for information.

Soils Equipment Reviewed

Under chairmanship of E. A. Willis, senior highway engineer, Public Roads Administration, Washington, D. C., an all-afternoon session was given to soils equipment.

Boring and sampling equipment, first discussed, was reviewed by T. E. Stanton of California. He described the Porter-type sampler, developed first in his state, as being the most practical and economical available—no casement, just sections of pipe which carry the driving force. It is usable for obtaining partially disturbed samples in soils not so liquid or granular that they will collapse. This type equipment is being used increasingly in several eastern states, and the Port of New York Authority is employing it for sampling as deep as 80 ft. in marshy land where hand equipment is the only feasible means.

Hand samplers can be used for softer soi's, but the need was spotlighted for other tools suitable for other materials, such as iron sands, caliche, disintegrated shales, bed rocks, etc.

Sampling and classification work in New York state was summarized, this state department now relying heavily on regional maps as a definite part of soils engineering. Some 3360 square miles of area was air-mapped recently. Used in conjunction with other data, these maps offer a working basis for planning boring schedules and permit advance choice of equipment. Location engineers, construction engineers and contractor personnel all use these maps, which are not too detailed, but mainly show land-form data.

During 1947, New York state highway engineers drilled 97,000 lin. ft. of borings. Test pits, augers, boring rods, cased borings, all types and sizes of equipment were used. Swamp borings cost only about 15 to 20 cents per foot. The real problem is that of boring through plastic clays and heavy glacial soils. Power equipment is indeed which is designed for soils and not for ledge rock (See editorial in March ROADS AND STREETS—Ed.). New York state soils engineers would like to see developed a drilling outfit which would cost about $15,000 and be heavily enough powered to sample the heavier soils and also be self-propelling. This equipment would be used in conjunction with the state's present seismograph and electrical resistance outfits, now employed on problems of advance classification of soils.

Better Contractor Data

Contractors particularly want to know the percentage of rock on a job, and the hardness of the rock. New York plans to include such data on plans.

Chairman Willis pointed to the need for a different type of boring outfit, especially suited for finding out what is under an old roadbed to be widened or partially reconstructed. It was seen that no one type of equipment could be developed that would be OK for everything. California, for example, is currently experimenting with equipment for sampling granular materials. The object is a light tow-type mobile unit, capable of putting down holes 6 to 8 in. in diameter in any material except solid rock. Meantime there are several machines on the market satisfactory for ordinary pavement subgrade borings.

New Mexico's soil problems do not require such deep sampling as New York's, observed Mr. Bail of that state. He described a truck-mounted boring rib, assembled with a Buda drill unit on the back of a truck, which puts a man-sized hole down to rock, so that a laborer can get down and drill another 10 ft. Information so obtained is given to the contractor on request. Upturned strata are studied as valuable sources of subsurface information, and sometimes strata are exposed for examination by trenching.

Other special units devised by various agencies were described. A small Jeep-mounted post-hole digger type unit was tried on an eastern project, but proved too light. California's highway equipment men have built several special units for district use, in conjunction with seismograph and electrical resistance equipment for determining character of lower overburden and rock.

(*Continued on page* 110)

★ Early spring rolling on turf shoulders using a berm roller

Establishment and Maintenance of

Stabilized Shoulders

Stabilized turf shoulders can help save maintenance and reduce accidents. Some common-sense thinking on a neglected subject

Presented at Purdue Road School, Roadside Improvement Section, Feb. 4, 1947, and at General Session, Feb. 4, 1948

By Dallas D. Dupre, Jr.

Chief Landscape Architect, Ohio Department of Highways, Columbus

THIS subject is a broad one and the problem involved is one which the present speaker believes to have been neglected or overlooked by the engineer through the years of highway development, excepting where he has more or less unconsciously adopted a system of shoulder stabilization in his own locality.

In Ohio, up to the present time, shoulder stabilization as a program consists of applying to the surface of the sub-graded shoulder a few inches of aggregate of various allowed qualities. I will not say this is bad, and I do not say it is good. As a rule, no regular stabilization program is practiced, and as will be pointed out later, in discussing seeding operations, I believe this procedure has proven of value.

Little Data Available

To indicate that the matter of stabilized shoulders, as planned work, has not been given extensive study by the engineers, let me say that very little information seems to be available to the "Shoulder" committee of the Roadside Development section of the Highway Research Board. This committee, headed by Mr. Frank Brant, Landscape Engineer of the North Carolina state highway department, combed the country for all available information, and found the pickings sparse, indeed. While the committee's prime object is to develop a procedure of establishing turf shoulders, it definitely sees the need of starting with a stabilized base.

With the above brief introduction, I feel that I can safely "open up" and tell what I have been able to pick up on the subject. If my present observations and declarations start some thinking, or some skeptical questions, at least I have helped start the ball rolling. This "paper" should not be considered as a technical discourse in any way, but a discourse on personal experiences and from listening to other people talk on the same subject.

My assigned subject refers to the *establishment* of stabilized shoulders, *and their maintenance.* That last word is a big one in any highway organization, and the operation is a big item, when considered from the dollars and cents viewpoint.

In view of this, I am going to pass rather quickly over plain stabilized shoulders and arrive at a type of shoulder that has proven itself easy of maintaining—namely, the turf or grassed shoulder. In a recent article in "Contractors and Engineers Monthly," Mr. Wells, Landscape Architect with the New York state highway department, restated truthfully a proven fact — "sod shoulders are

★ Preliminary preparation of shoulder subgrade

★ Box drag with roller. This method used to "shove" slightly high grass shoulders, or spread and level aggregate on aggregate shoulders in combination with rolling

cheaper by far to maintain than an aggregate shoulder";—and a shoulder, to be practical, must either be aggregate or turf, eliminating at this time the bituminous, or treated, shoulder, this being another subject entirely.

Ohio Requires Compaction

What of the strictly stabilized shoulder, minus grass? Here Ohio requires compaction of the sub-grade. Various state specifications require or permit a mixture of coarse stone or aggregate with the earth in the subgrade. Usually this consists of material from the old road, or chips, stones and aggregate debris resulting from rock excavations. All of this is good, and furnishes a solid base. This base is then topped with aggregate material of various approved types, varying in thicknesses and in width of application. There mostly is no general set standard. It seems to depend upon the plan engineer who put the finishing touches on that particular set of project plans.

This can be called the true stabilized shoulder. But it is a constant source of expense—dragging, blading, adding material and rolling.

Let us see if there isn't something better—at least something that will serve in say 99% of all cases. Is it possible to have a stabilized shoulder covered with vegetation, cheaply maintained? The answer is yes, proven many times in Indiana, Ohio, Virginia and elsewhere.

To prove this statement, let me remind you of the work performed and the results obtained by the Indiana highway department and the experimental work done by Dr. G. O. Mott, agronomist at Purdue University.

Dr. Mott set up his experiments as "trial plots" first, then carried them to your highways. His findings were as follows:

Dr. Mott's Findings

To have a stabilized turf shoulder, aggregates must be present to obtain sufficient supporting power for the anticipated load. To grow grasses, certain other materials must be present to create necessary favorable conditions.

It was found that pit-run gravel (bank-run, we call it in Ohio), or crusher-run stone, all passing a 1-in. screen, did the trick of furnishing the supporting power. These materials are standard or typical highway construction items. The depth or thickness of the material is governed by a study of the anticipated traffic on a given section of highway, considering the type of traffic, etc., volume and the possible changes over a given period of years.

To grow grass in and on this aggregate one needs to provide sufficient pore space (or voids), proper Ph, which means degree of acidity or alkalinity to satisfy the varieties of vegetation used, sufficient plant nutrients and available water supply. By adding 5% and 10% of soil to the aggregates, some of the above factors are taken care of. This soil, which should preferably be clay, aids compaction, and at the same time the "voids" are preserved, it holds moisture, and the soil colloidal materials will hold the fertilizers which are added to give the main supply of plant nutrients.

Dr. Mott's work showed that the fertilizers—complete commercial types, containing nitrogen, phosphorus and potash — should be mixed throughout the soil and aggregate, and not applied as a surface feeding in the

★ Stabilized shoulders along U. S. 40 and in Ohio—turf standing up well in spite of severe use by the heavy traffic. Another example of stabilized turf shoulders which have stood up well—a state route in Lorain, Ohio, completed early in 1945

original operation. Later applications may be needed, however, as a stimulant to further growth and to promote root penetration. It was found that surface fertilizing prevented or discouraged root penetration if not preceded by the earlier thorough mixing operation.

Fertilizing Essential

It was shown that grasses suitable to Indiana and Ohio would grow luxuriantly in the aggregates provided that nutrients were added, and regardless of a considerable depth of aggregates, even though these aggregates were compacted to a density comparable to that required in road bed construction.

Pit-run gravel, having a larger percentage of "fines" will support grass with only a 5% addition of soil whereas crusher-run stone will require the 10%.

Nitrogen and phosphorus were found to be the most needed nutrients, whereas potash was less important.

A slight surface layer of top soil aided in seed germination but is not too essential.

A straw mulch aids materially in preserving moisture, hastening germination and preventing erosion until the grass takes over.

The above procedure puts the horse *in front* of the cart. In Ohio a number of years ago we started a practice of shoulder work which now may seem to put the cart first. We went on the premise that a regularly compacted earth shoulder, turfed over, would bear the greater percentage of our shoulder traffic load. In this we have been pretty nearly right—right enough to justify the program, still continuing.

Our shoulders, in fill, are compacted in 8-in. layers, compaction coming up to 90% to 100% minimum field compaction. The top two or three inches is not compacted and consists of top soil or good earth, if any, resulting from scalping operations. This is a part of our construction specifications. Shoulders in cut are left pretty much as found, excepting that top soil is applied, in most cases.

From here we fertilize, lime, seed and mulch, working right up to the edge of the pavement. And then we open the road to traffic.

Generally within a period of three to four months we know whether this type of shoulder will take the type and volume of traffic. If it can't take it, and such cases are few, then the maintenance department comes in and places aggregate to a depth and width judged necessary to do the job.

However, even here there are variations. Quite frequently it is enough to place some coarse stone, crushed limestone being the best, over the shoulder and roll it in, letting the grass continue to grow in the intervening spaces. The cost of a possible two or three treatments of this sort, if they will eventually give a satisfactory stable surface is cheaper than the constant maintenance of the open or solid aggregate shoulder.

The problem of maintenance of both types of shoulders can be briefly outlined.

How to Maintain

The maintenance of the aggregate is best performed by equipment that will smooth the stone, level it with the pavement, and permit the even application and distribution of new stone when required. The box-drag, as developed in Ohio does a good job of this. The blade grader for general use is obsolete and condemned for this use, in our opinion.

Maintenance of established grass shoulders consists of "spaced" mowings, rolling, sweeping and occasional light "scalping" in the early spring, and such repairs as are necessary to mend minor damage.

I want to conclude this present outline with some cautions and "explained" exceptions:

Good engineering is essential from start to finish; the grade of the shoulder, for surface drainage, and the handling of the underground water must receive due consideration; shoulders not stable enough to handle the *known* traffic should not be camouflaged with grasses; "build-up" of turf shoulders is almost a certainty but can and should be handled or corrected judiciously and economically; every chance should be given to the turf shoulder before abandoning it to the costly maintained shoulder—one rut or even a dozen may not mean that the traffic is too severe—mend these early ruts with "like" material and see whether the results are satisfactory or not, before taking drastic action.

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Earthfill Dam Projects—Bids are expected to be asked soon by U. S. Bureau of Reclamation, Denver, Colo., for the construction of the following earthfill dams: Missouri Basin Project, Colorado, Bonny dam in South Fork, Republican River, west of Hale, Colo.; San Luis Valley Project, Colorado, Platoro dam on Conejos River, about 30 miles northwest of Mogote, Colo.; Paonia Project, Colorado, Spring Creek dam on East Muddy Creek, about 20 miles northeast of Paonia, Colo.

"HE SAY DEY IS A EXPEDITION COME TO GET THE LATEST ON MODERN HIGHWAY CONSTRUCTION AT THE ROAD SHOW!"

Photos by The Port of New York Authority

★ Windrows were scuffed down, with or without use of Roto-wing, to aid work of displacement plows

Runway Snow Plowing Plan

Paid Off at LaGuardia Airport

One runway opened within five hours after record-shattering storm of Dec. 26 had stopped. 21 flight operations during worst 24-hour period, 190 next day, 400 on second day. All ground employees drilled in advance on emergency duties. Job aided by ample modern high-speed heavy-duty equipment

WHILE New York City was still digging out of the 26-inch snow storm of last Christmas week, officials at LaGuardia Airport were having their share of the fun. And also an opportunity to put to a real test their unique advance plan for meeting snow storm emergencies. Briefly, the plan consists of organizing the airport's entire supervisory and maintenance staff of some 70 men into emergency snow fighting teams. The field's 39 firemen and policemen, as well as others, had been put through a school and rehearsed all last autumn on their specific duties. Many were taught the rudiments of plow operation. A procedure was perfected for alerting men to their assigned posts, comparable in thoroughness to that of the big highway and street department snow organizations.

More later on the plan. The point is, it worked. In spite of having to abandon clearing on one runway and begin on another during the 24-hour period of the storm, the crew cleared a runway area 6,000 x 200 ft. by 8 a.m. Dec. 27, or within five hours after snowing stopped. Take-offs were made that day, but no planes could land for lack of cleared storage space. At 7:50 p.m. the first plane landed, bringing Mayor William O'Dwyer from the west coast.

★ At work on the second runway, day after the storm abated, using one of a fleet of Walter snow fighters

Plows Get Going

First, let's see what happened when the storm hit. Snowfall began soon after 3 a.m. Dec. 26, and by 4 o'clock the procedure was in operation. As part of the plan, a crew had already set out 60 yellow cone elevated lights several weeks prior to the storm, these lights being mounted on supports plugged into the flush light sockets.

Decision was made to plow the long NE-SW instrument runway first, since the wind was due to remain in the NE for a while. Plows on this runway could "split the wind" and thus throw farther laterally. A wind shift was due later, however, and the storm was forecast to cease by 10 a.m.

As per plan, one blade plow initially worked clockwise along the sides and ends of the runway, clearing a path beginning 3 ft. inward from the

lights. Blades were set to push inward, thus forming a small windrow which could serve as a guide during poor visibility to men working fast Walter V-plows along the centerline—and as protection for location of the lights. After this first path was opened, outlining the runway, two blade plows in echelon began on the runway centerline, plowed counterclockwise and blading outward against the initial windrow. A Bros rotary had also been brought in and had made one pass as a test to determine its efficiency in the wind. Ten o'clock came, then noon, and snow was still falling at such a rate (2 inches per hour or more) that windshields were completely blocked. The men were called off and sent to rest in the Emergency Crew's headquarters.

Tried Another Runway

After successive changes, the weather forecast predicted snow would abate by 2:30 p.m. December 26, but at 6 p.m. snow was still coming down, and over 15 inches had accumulated. It was decided to begin all over on another runway, to meet a predicted windshift. Three heavy Walters trucks, one with a V and two with blades, began on the same plowing plan as described. Eventually six trucks—three blade, two V's and one Roto-wing V—were in the fray. Four rotary plows—two on each side—were added when 100 ft. of width had been cleared. About 3 a.m. on the 27th the storm stopped, and by 8 a.m. the 6000-ft. runway was cleared 200 ft. wide and all lights visible. At 9:37 a.m. on the 27th, the first flight took off.

The Roto-wing was credited with valuable work. This unit cuffed off the windrows, enabling the displacement plows to keep working the heavy, wet stuff outward.

The other runways were tackled, and a fleet of auxiliary equipment was put to work clearing aprons, taxiways, hangar entrances, roadways, parking lots, and other areas. A tractor-shovel was used for a limited amount of loading into trucks, although snow-hauling was minimized because of expense. Five Case tractors with enclosed cabs worked in three shifts around the clock on sidewalks, passenger loading areas, etc.

★ Clearing in front of administration building

A utility panel truck carrying hot coffee was considered to be the most important piece of equipment on the job, and 50 blankets and army cots not the least important.

After flight operations had resumed, plows continued to work the snow back in order to provide storage space for later snows. A 15-yd. LeTourneau earth mover scraper with tractor was used to good advantage to spread big snow piles out in packed 6-in. layers as a carpet under parked ships in front of hangars. Eight 3½-ton Reo trucks with 10-ft. blades performed cleanup clearing, worked on roadways and around gates. These trucks and the Case tractors were sent out to these areas early in the progress of the storm, and worked until a 10-in. accumulation stopped them.

More on the Plan

Coming back to the emergency plan, the airport staff last autumn was split into two teams of about 35 men each, for day and night work (8 a.m. to 8 p.m. and 8 p.m. to 8 a.m.) Each team, under the plan, was to be headed for snow-clearing purposes by a general foreman and a maintenance foreman. Schedules were posted and alternated every two weeks during late autumn and winter, showing which team each man was on and the period he was on standby basis for snow emergencies.

A Snow Control Desk was established as an intelligence center for personnel phoning in for instructions and for calling men to duty. A radio monitor, posted here at all times, received weather forecast data at four-hour intervals and passed it along to all executives. Also headquartered here were three liaison men who had control-tower experience. These men were to go out in patrol cars and direct plowing operations with an awareness of the field's operational problems and needs.

Since the purpose of an airport is to get planes in and out, airline officials have a close interest in snow-clearing progress. Each airline was assigned one day in the week during which it was made responsible for seeing that the hangar and service needs of all lines were anticipated. This job centered in an air line committee, whose representative for the day gathered all requests made by individual airline companies and then made up a priority list and procedure for the day's work to the airport management. Every two hours a report was issued by Telautograph and interphone to all lines, as to progress so that their flight dispatchers could set up schedules of landings and departures.

A Busy Month

Nearly a month of steady snow-clearing followed the big storm. Six additional snowfalls had to be cleared during January.

Thirty-four units aided in the December 26-27 battle. A $400,000 laboratory of equipment happened to be available, due to the temporary massing at La Guardia of equipment eventually scheduled to serve Newark and the new New York International (Idlewild) Airports when operated by the Port Authority. Equipment manu-

★ This scraper was used to disburse piled snow out in thin packed layers throughout non-usable areas. Trucking away of snow was kept to a minimum to save expense, but a large tonnage had to be hauled nevertheless

★ Four rotaries—two on each side—widened on out to the full 200 ft. of runway w dth

facturers sent experts to the scene to aid and to learn the inevitable lessons of a big storm. Manufacturers have put more and more horsepower under the hoods, and the value of this added power and the high speed displacement plowing was well demonstrated here.

Port of New York authority officials regard the snow clearing problem essentially as one of common sense planning and constant management. For LaGuardia, or any other given field, the performance characteristics of various machines can be used as a basis for assembling a balanced fleet, designed to do a given job of clearing in a prescribed time. But no two heavy storms involve the same wind direction and velocity, character of snow, temperature and ice conditions. Good equipment and experienced crews must be directed with judgment. The job this past winter has been costly, but the big point is that America's busiest commercial airfield stayed open.

The snow removal job was one that required supervision at all times. During the days and nights following the first snow of December 26, the three airport managers stayed at LaGuardia, sleeping in turns in their offices. These were Port Authority general superintendent of airports Hervey F. Law; LaGuardia acting superintendent Gordon Hamilton and assistant superintendent George M. McSherry. Assisting them in supervision were Walter L. Bennett, general foreman; and Milton B. Porter, maintenance foreman at the airport.

Besides the airport, the Port Authority had big snow removal work to do at its other vital facilities: the great George Washington Bridge, the three Staten Island bridges and the approaches to its Holland and Lincoln Tunnels. All were kept open by efficient Port Authority crews and, after the record big storm, the Authority's director of operations, Billings Wilson, sent a bulletin congratulating all the men and stating that snow can no longer have any fear for the Department of Operations.

The Port of New York Authority Airport Snow-Removal Equipment on Hand December 18, 1947

La Guardia Airport

Q'ty.	Description	Expected Date	Remarks
1	Jeep—Ford—Lic. No. 9030	Delivered	4′ Reversible Plow #311
1	Cargo, Chev. 1½ ton, Lic. No. 113285	Delivered	10′ Reversible Plow #314
1	Cargo, Chev. 1½ ton, Lic. No. 113295	Delivered	10′ Reversible Plow #324
1	Tractor, Cletrac, Lic. No. 113296	Delivered	Bulldozer—#325
1	Rebuilt, Walters Snow Fighter	Delivered	Rotowing #323
1	Rebuilt, Walters Snow Fighter	Delivered	(Sander) #322
1	Bros Rotary Plow, Model "MAL"	Delivered	
2	Sno-Go-Model "TU-3"	12-19-47	
1	Conveyor Loader	2- 1-48	(Sand)
2	Case Tractors	Delivered	8′ Reversible Plows
1	Dump Truck (Reo) 3½ ton	Delivered	10′ Reversible Plow #359
1	Dump Truck (Reo) 3½ ton	Delivered	10′ Reversible Plow #360 (Sand Spreader)
1	Dump Truck (Reo) 3½ ton	Delivered	10′ One-Way Plow #364 (Catch Basin Cleaner)

N.Y.I.A.

1	Walters Snow Fighter	Delivered	
1	Walters Snow Fighter	Delivered	(Sander)
1	Bros Rotary Plow, Model "MAL"	12-24-47	
2	Sno-Go-Model "TU-3"	12-24-47	
1	Patrol Grader	Delivered	
1	Shovel Tractor	12-30-47	
1	Conveyor Loader	2- 1-48	(Sand)
1	Dump Truck (Reo) 3½ ton	Delivered	10′ Reversible Plow #362
1	Dump Truck (Reo) 3½ ton	Delivered	10′ Reversible Plow #361 (Sand Spreader)
1	Dump Truck (Reo) 3½ ton	Delivered	10′ One-Way Plow #365 (Catch Basin Cleaner)

Floyd Bennett

1	Walters Snow Fighter	Delivered	
1	Walters Snow Fighter	Delivered	(Sander)
1	Bros Rotary Plow—Model "Mal"	12-24-47	
1	Sno-Go-Model "TU-3"	12-24-47	
2	Case Tractors	Delivered	8′ Reversible Plow
1	Dump Truck (Reo) 3½ ton	Delivered	10′ Reversible Plow #363 (Sand Spreader)
1	Dump Truck (Reo) 3½ ton	Delivered	10′ One Way Plow #366 (Catch Basin Cleaner)

Flight Strip To Provide Water Supply

Use of a flight strip to divert rainwater into underground catch basins to provide adequate drinking water supply for the Island of St. Thomas, Virgin Islands, is part of a public improvement project now being planned by the Bureau of Community Facilities, Federal Works Agency, Washington, D. C. Bids were scheduled to be opened June 15 in the office of the Deputy Commissioner of Construction, Bureau of Community Facilities, Washington, D. C., on the installation of drainage pipe lines for the collection of potable water and the construction of a high level water reservoir. The project also calls for a water treatment plant, water supply and a water distribution system. The proposed flight strip will be 4500 ft. long by 200 ft. wide, so designed that rainwater will drain off into a "catchment" or underground catch basin with a million and a half gallon storage capacity. The strip is to be located at Charlotte Amalie, St. Thomas.

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10% Increase in Motor Vehicle Registrations—The number of motor vehicles registered for use on U. S. highways has increased at the rate of approximately 10% each year since the end of the war, according to figures compiled by the Public Roads Administration, Federal Works Agency, from reports of state authorities.

Face-Lifting Milwaukee's Wisconsin Ave.

Traffic and old fire and police conduits and water and sewer lines made this widening and reconstruction job a tough one. Contractor's special traveling forms expedited placement of raised center strips in concrete base

THE Milwaukee department of public works recently completed the $596,000 job of widening and repaving Wisconsin avenue between 11th and 27th streets. As with many cities, Milwaukee's "main drag" had become too small to accommodate increased traffic.

Paving accounted for little more than half the total cost. The rest went for repair and adjustments of cross streets and relocation of water, sewer, power, fire and police lines. The original sheet asphalt surface on a 6-in. concrete foundation was built in 1894 and was resurfaced in 1906. Its retirement was well-earned.

The new pavement consists of an 8-in. concrete base with a 3-in. asphalt surface. Curbs were set back 5 ft. on either side, thus furnishing a 60-ft. roadway. Pedestrian safety islands 5 ft. wide by 30 ft. long were provided along the street center at either side of intersections. Projecting 7 in. above the road surface, these concrete islands were considered a necessity in view of the street's width and heavy volume of pedestrian and auto traffic. Through each block between islands, 9-in. wide traffic marker strips were provided about 2½ ft. each side of the roadway in line with the islands. These 3-in.-high x 9-in.-wide concrete strips were cast monolithically on top of the concrete base.

Traffic lights and 40-ft. poles with double light brackets for illumination were erected on each island. The center of the lights is approximately 25 ft. above the pavement. On primary intersections there are 10,000 lumens per light or 20,000 lumens to each pole. On secondary intersections 6,000 lumens per light are furnished. Two intermediate lights in each block are spaced to divide the block into three equal parts. All illumination poles and lights were furnished by the city.

Replaced Old Hollow Logs

First on the job were the conduit and piping installers. Fire and police alarm call boxes are located in every other block. The steel conduit, installed in 1896, was replaced with 3½-in. fiberduct. Working conditions were complicated by heavy bus, truck and passenger car traffic. Time was the big problem. Careful planning and team work enabled the conduit and piping crews to keep ahead of the paver. During earlier stages of construction, traffic was maintained, but paving operations eventually blocked off portions of the job.

Considerable difficulty was experienced in the location of old mains and services which had been laid about 70 years ago. Some of the 8-in. and 12-in. cast iron mains were laid in 1876, but were still in good condition. Several sections of Tamarack wood pipe were found. Cut from solid logs, the inside diameter was 2½ in., the outside diameter 6 in. and the length of each section about 7 ft.

Existing water mains were located in the north half of the street about 7 ft. from the old curb line. Hydrants, of course, had to be moved to a point 2 ft. back of the new curb line. In order to form a dual system a new 16-in. cast iron main was laid on the south side of the street and tied at intersections with the water main on the north side of the street.

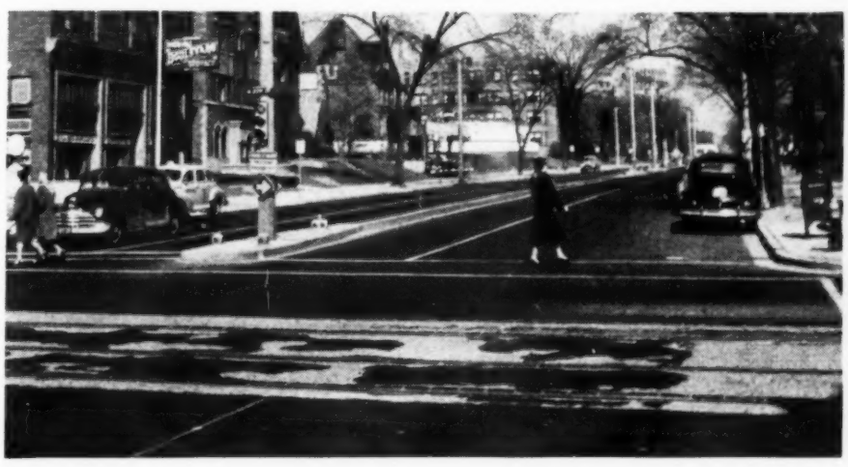
Starting in May, 1947, near the west end of the project, the water main contractor completed his work in four steps. First, he laid the new 16-in. main; second, he flushed the new main and obtained a water sample for testing; third, he connected the services to the new main; fourth and last, he cut off the old services.

Two water main crews worked 1 or 2 blocks apart. One crew laid the pipes and the other tied in the new services. All mains are located about 6½ ft. below grade. The bottom of the 30-in.-wide trench was dug by a clamshell to a depth 2 in. beneath the pipe to allow for blocking. All joints were leaded and the trench was backfilled with sand and gravel. Six-yard trucks wasted the excavated clay in an area conveniently located near the sand and gravel pits. A 2-in. hose with a 4-ft. length of 1½-in. pipe on one end was used for flushing.

Starting last May also, the sewer department increased the capacity and lowered the gradient of the sewer in the two blocks at the east end of the project. Using a clamshell and starting at the lower end, they lowered the sewer 3 ft. and replaced the old 24-in. concrete sewer with new 27-in. and 30-in. reinforced concrete sewer pipe. Excavation was carried 6-in. below the pipe which was supported on a concrete cradle. New manholes were built of concrete block.

Pavement Removal

The entire old pavement together with the curb and gutter section was removed and replaced with a new pavement and curb and gutter section. The concrete walks were left in place



★ Pedestrian island at 27th St. end of Milwaukee's street-widening project

★ Caterpillar Hi-lift Traxcavator loaded broken paving slabs into 6-yd. Sterling trucks

except where poor condition or grade warranted their removal. Removal of the 53-year-old natural cement concrete pavement was not difficult. Although traffic was kept off Wisconsin Avenue, all cross-streets were kept open. The concrete was loaded on 6-yd. Sterling trucks, using a 1½-yd. Lorain shovel and a Caterpillar Hi-lift Traxcavator equipped with 3-yd. bucket.

The loose subgrade required no scarifying. The Sterling 6-yd. trucks hauled in backfill earth, and two Caterpillar graders and one Jaeger subgrader gave the subgrade its finishing touches. A screed was used for the final setting of manholes and water stop boxes.

As a rule, concrete curb and gutter sections were built first, establishing the grade at one end for the strike-off and also providing the proper grade for walks. Where needed, sidewalks were built next. Ready-mixed concrete was used for curbs, walks and pavement.

Base Mechanically Finished

The 57′ 6″ wide base was concreted in three 19′ 2″ lanes. The equal-width pours permitted a mechanical strike-off machine to be used without readjustment. The center section was placed first, using a Jaeger finishing machine with steel wheels riding the forms. Side sections were then paved, the finisher being fitted with rubber-tired wheels. The entire top surface of the base was thoroughly roughed by wire brush. Steel ⅝-in. dowels were provided at island locations.

Air entraining cement was used for exposed islands and cast traffic strips. Wood and sheet metal forms for the islands were held in place on top of the new concrete base by sand bags and wood cross-bracing.

The contractor's method of casting the two traffic strips on top of the green concrete base is of special interest. The sketch shows the details of the contractor-built rig which rode the steel forms of the center base section and was pulled by the base strike-off machine. The forms, consisting of four small steel channels 30 ft. long, were adjusted to the proper elevation by means of simple set screws and filled by hand with concrete. Although the forms were in motion, their 30-ft. length protected the fresh concrete a sufficient length of time. Four welded steel trusses, spaced 10 ft. apart, rode the center base section forms and supported the channel forms.

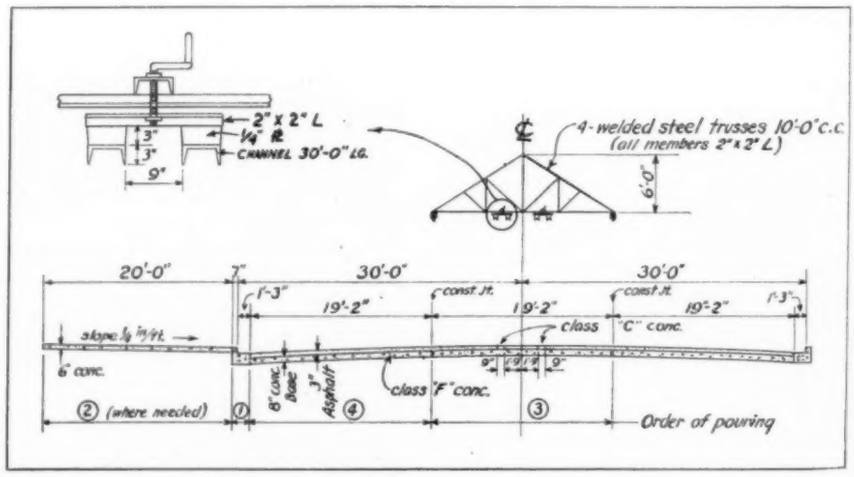
The contractor's hot mix asphalt plant 2-ton pugmill averaged 500 tons a day. Lined and covered 6-ton trucks carried the mix from plant to job. Finishing was accomplished by a Barber-Greene finishing machine. Joints were worked by hand. The narrow 3′ 6″ wide center strip was rolled with a 1½-ton Littleford roller and the 26′ 3″ wide outside strips were rolled with 10-ton and 13-ton Iroquois rollers. All asphalt surfaces were swept dry with cement before rolling.

Acknowledgment

This project was planned and supervised by the Milwaukee department of public works. Raleigh W. Gamble is superintendent of street construction. J. L. Proskine, superintendent for Frank L. White Paving Corporation, the paving contractor, was in charge of concrete and asphalt work.

Parking Meter Results

Public Works Engineers' News Letter states that in 13 of 20 representative U. S. cities surveyed, most of the original parking meters are still in service after a decade or more of use, according to a study made by the International City Managers' Association. Officials of Auburn, Dallas, Ft. Worth, Portland and Watertown estimated the "natural life" of their parking meters at 10 years. Omaha and Wichita Falls, Tex., said their meters were good for about 15 years. Other estimates were El Paso, 12 to 14 years; Houston and Kansas City, 8 years or more; and Miami, 5 to 7 years. Biggest maintenance problem is insertion of slugs and other foreign materials. The reported cost of making collections and of maintaining meters averaged 10% of revenues.



★ Four trusses, each similar to the one shown, rode on the steel forms of the center pavement section and carried the 30-ft. long traffic strip channel forms

Soil-Cement Ditch Lining

Economical Means of Preventing Erosion

IN the Aug. '47 issue of R & S we pictured and briefly described an example of soil-cement lining, as used on a roadside ditch in Texas (inadvertently gave cost as 30c per sq. ft., instead of 30c per sq. yd., the latter being correct).

Here are pictures of additional ditch lining work of this kind, which we understand has been used to quite an extent in District 10 of the Texas highway department in place of sodding with Bermuda grass. Sodding is said not to be entirely satisfactory because of silting of ditches and maintenance expense incurred during the year required for grass to sod properly.

The procedure in placing soil-cement lining was first to shape ditches to the required cross-section, but cut four inches lower than the finished grade. The sides of the ditches were given the same pitch as the adjoining slopes, so that sod on the slopes could be brought down flush with the surface of the finished ditch paving, thus leaving no "shoulder" which might retard flow of water into the ditch from the slopes.

Soil-cement was mixed in a pugmill of 14-cu. ft. capacity equipped with a skip. Soil used was a fine sand on which previous tests had been run. Cement content was 7.4% by volume (2 bags per cu. yd.). Sand was shoveled direct into the skip and measured by leveling to a mark.

When mixed, the soil-cement was spread 4 in. deep with hoes. Initial finish was obtained with wooden floats and final finish with trowels. Near intersections and at driveways, where soil-cement was subjected to traffic, the thickness was increased to 6 in. and the cement content was raised to 11% by volume (3 bags per cu. yd.). Cost of the finished soil-cement in place, 4 in. thick, averaged 45c per sq. yd. (early war period prices).

650 Million in New Equipment Needed

DUE to the accumulated deficit of the past few years, some $650,000,000 worth of road building and maintenance equipment will be needed for the 1948 highway program, Charles M. Upham, engineer-director of the American Road Builders' Association, told equipment engineers in Washington, D. C., recently.

Improvements in equipment are keeping pace with the postwar highway program, Mr. Upham added. The American Road Builders' Association's first postwar Road Show to be held at Soldier Field, Chicago, July 16-24, will demonstrate striking advances in efficiency of the new road-building equipment designed for the greatest highway construction program in history.

In discussing the importance of equipment in the highway program, the ARBA official estimated that approximately $240,000,000 worth of equipment will be required by state, county, and municipal governments for highway maintenance this year.

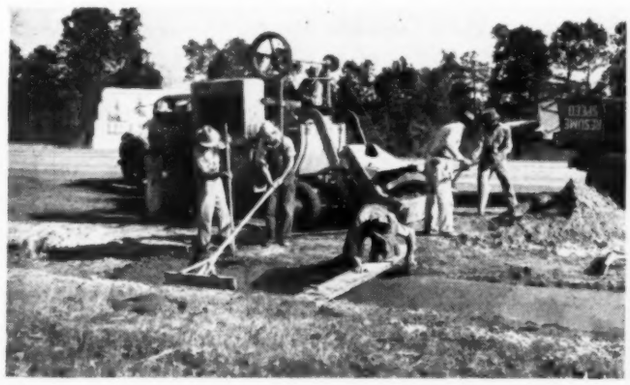
The $1.5 billion 1948 construction program will call for another $265,000,000 worth of equipment. Mr. Upham stated that an additional $150,000,000 must be invested in new equipment to bring construction equipment inventories up to normal. From 1922 up to World War II, continuous improvements in road-building machinery were made to meet demands of constantly improving highway design. Had it not been for this continuous improvement, road-building costs would now be prohibitive, this speaker said. During the war, machinery was necessarily standardized and few changes were made. Since its end, equipment manufacturers have made rapid progress in developing new equipment designed to operate more economically and efficiently.

In the huge 30-acre display area at Soldier Field thousands of pieces of equipment will be exhibited by more than 300 manufacturing concerns, with many new developments on view for the first time. Machinery and materials used in building and maintaining highways and airports all over the world will demonstrate advances in utility and service developed by the equipment industry.

The 1948 Road Show will be featured with "largests" and "firsts," new tricks, and new techniques to help the road builder get the most out of his equipment.

Demonstrations, films showing roads in use and under construction, and displays showing development of road-building machinery will add to the interest of the greatest Road Show of all time.

The 45th annual ARBA Convention will be held concurrently with the Road Show. Road builders from all over the world will hear international authorities discuss all phases of street, highway, and airport construction.



★ Smoothing soil-cement mixture with wooden float

★ A completed ditch, which averaged 45c per sq. yd. (early wartime prices)

Adams advantages pay off for Morrison-Knudsen!

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The extension of the Los Angeles Airport by Morrison-Knudsen was a soil-cement job involving exacting operations—grading, mixing, spreading and finishing.

One of the busiest machines on this M-K job was the Adams Motor Grader pictured above. First of all, the machine handled the original sub-grading. Then came windrowing of the material for the mixing machine. Lastly, the soil-cement mix was spread and finished to rigid specifications.

To finish fast-setting soil-cement mix to exacting specifications calls for working at highest possible speeds, plus real precision control. Adams 8 overlapping forward speeds, coupled with positive-acting mechanical controls, provided exactly the right combination to meet every requirement of this M-K job. And you can depend on it—Adams advantages pay off in a big way on every type of grading operation. For full information on the world's most complete line of motor graders, see your local Adams dealer.

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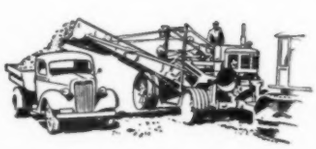

MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS

Better Relations Between

Engineers and Contractors

A frank and refreshing discussion . . . do any of these remarks hit where you live?

By Joseph Cohan,
Holmes Construction Company,
Wooster, Ohio

YOU will notice that I entitle my subject "Relations Between Engineers and Contractors." I was very careful to put engineers first for fear that some of the members of the engineering profession might be as touchy as the troup of actors that was stranded in a little town on the Mississippi River. The show blew up, and there they were without any funds or any friends. They were trying to make their way up to Natchez in the hope of finding a new financial backer. They finally prevailed on a captain of a boat to take them along. He was hauling a couple of barges of manure. He agreed to take them, provided they would stay on the barges and not clutter up his tugboat. As he was going up the river he was hailed by the skippers of the various boats he was encountering who usually shouted, "Captain Brown, what have you got there?" He invariably answered, "Manure and actors." After he gave this answer two or three times one of the actors made his way to the captain's cabin, and in his best Shakespearean manner he told the captain that the least he could do was to mention the actors first.

Problem Defined

The relations between engineers and contractors are primarily a problem in human relations aggravated by necessary checks and balances placed on all of us who handle somebody else's funds, be they public or private. When I am talking about these relations between engineers and contractors, I am not referring to the question of whether or not an engineer should accept a lunch, football tickets or even a drink from a contractor. This is a matter that has to be settled on an individual basis. From my personal experience on both sides of the fence, I can tell you that with some contractors you can allow them to take you any place without seriously disturbing relations on the job, but with others, if you let them buy you a hamburger, be prepared to give them the court house. By the same token, I have known engineers who will waive a technicality in the specifications and immediately expect at least a trip to Paris or a reduction in the price of the contract that is way out of reason. The history of construction shows that there have always been differences of opinion between contractors and engineers as to what the contractor is supposed to do. They tell me they even had trouble in building the pyramids, but maybe I shouldn't have mentioned them as they were built with government forces, and you know how contractors feel about such projects.

Given before the recent Ohio Highway Engineering Conference, Ohio State University, Columbus

Teamwork, Always

I believe engineering schools could well spend some time discussing engineer-contractor relations, because I feel that some of the attitudes that a portion of the engineers have originate in our halls of learning. It is only natural that when engineers are taught to write specifications and contracts they will begin to look upon the contracting fraternity with a slightly jaundiced eye. It is quite true that in the past this cops and robbers attitude was quite justified because of the actions of a small percentage of our old-timers. I recollect a contractor of the old school who was stupid enough to think that he could save money on a highway job by sending some of his crew in the middle of the night to open a cement car, cut open each bag of cement, take out a shovelfull from each sack and re-tie the bag. Incredible, you might say, but it happened. At that he was no worse than the chief engineer of one of our southern states who made the statement that the year he didn't break at least 20 contractors he didn't earn his salary.

I can assure you that in the 27 years I have been connected with the construction industry, the picture has entirely changed. There has been a tremendous improvement in the quality of the personnel engaged in the contracting business. This is largely due to more and more graduate engineers coming into the construction field, and at the present time I know of only a few construction organizations whose top men aren't technically trained men.

With this in mind let's see what we can do to change this attitude of suspicion on both sides, and instead start working as a team for the benefit of the public or private industry, who uses our services.

Let both sides start by acknowledging that each side is human, and that brains and honesty are to be found on each side of the fence.

It is the job of both parties to design and construct a project for the owner at the least possible cost consistent with good workmanship and pleasing appearance. Periodical consultation between contractors' and engineers' organizations should result in considerable saving to the public. We all know that a well-built job starts on the design table. Too often we start in the field with a pretty-looking bridge with fancy railings which will cost 30% more than necessary. While the designer knows how to get the last pound out of his steel and concrete he forgot that in these days when contractors are paying $2.50 an hour for carpenters and ironworkers the extra trim is lifting the cost of concrete $10 to $15 a yard.

Clear Specs Needed

Let's write clear and fair specifica-

(Continued on page 72)

JAEGER ENGINEERED for

Because more air is THERE

Steady pressure from the over-size air receiver of his Model 210 Jaeger enables Ralph Facciolo to complete several hundred feet per day of 30″ cut in New York City pavement (5″ asphalt top on 6″ concrete base).

From 60 to 600 cfm of air requirements, Jaeger engineering gives you the combination of high efficiency compressor unit, big engine and up to 70% larger air receiver that keeps steady full-pressure behind your tools, plus the great economy of Jaeger "Fuel Miser" control which automatically regulates the engine speed to air demands.

It is this "Air Plus" performance that makes Jaeger compressors first choice today with operators who rate results on the basis of daily footage drilled, yards of pavement broken, material excavated or other measures of *actual job production.*

If you're interested in getting more work done for the wages that you pay, see your Jaeger distributor about a new "Air Plus" compressor.

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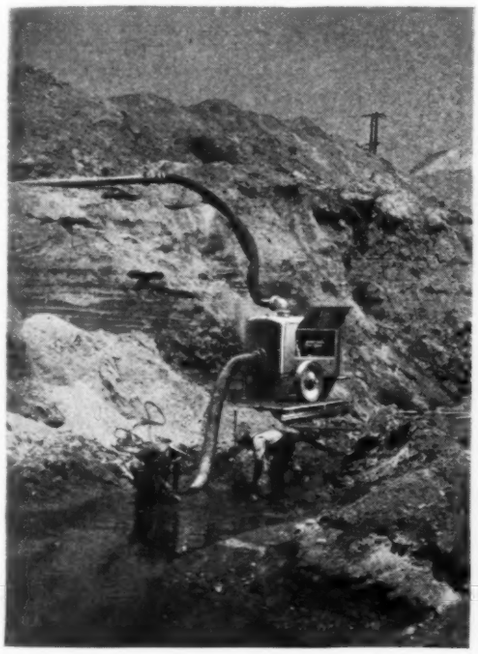
2. Combination of diagonal rear screed and transverse front screed produces a more accurate surface than is possible with any transverse finisher; finishes stiff mixtures faster without tearing; saves extra passes and reduces costly hand work.

3. Faster, more flexible, with its screed speeds fully independent of traction, this revolutionary Type "X" Jaeger gives you the mass-production finisher you need with today's mass-production pavers.



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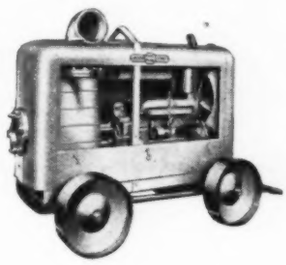
Latest improved models, with greater capacity and range of work, mechanically remix, spread, compact and strike off material behind as many as two pavers, ready for precision finishing. Spreading screw, exclusive with Jaeger, positively eliminates segregation and resulting honeycomb, produces denser slab texture than any other method. Core tests prove it. Widths 10-15, 20-25 ft.

GOODBYE WATER!

The sure way to lick a water problem is to start the engine on a Jaeger "Sure Prime" Pump. It's extra powered, conservatively rated and equipped with two separate, simultaneous priming actions — to prime faster, pump full volume under tough conditions and for thousands of hours longer than ordinary pumps.

More Pump for Your Money: Only Jaeger gives you a factory-tested and certified pump completely enclosed and weather-protected, with both inherent and jet priming, replaceable liners or seal rings, long-life Lubri-Seal, self-cleaning shell design and capacities from 3000 to 240,000 gph to meet any need for drainage or supply work.

Sold, rented, serviced in 130 cities of U. S. and Canada. See your Jaeger distributor or send for latest catalogs on Pumps, Air Compressors, Finishers, Spreaders, Mixers, Hoists, Bituminous Pavers.



2" to 10" heavy duty dewatering pumps . . . 2" to 8" pressure pumps for higher heads . . . lift and force diaphragm pumps . . . caisson pumps for depths exceeding 100 ft.

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(*Continued from page* 69)

tions. Volumes can be written on this subject of specification-writing. There are two schools of thought on the subject. One leans to the specifications that hold everything down to the satisfaction of the engineer, and the other one specifies the minutest detail of operation, and then expects the contractor to be responsible for the results. I have served on two committees attempting to correct the worst features in the specifications of a neighboring state, and I wish I could tell you that we have accomplished some good, but I have to admit that Old Man Suspicion and Old Lady Tradition licked us. I must admit, however, that every time I find an obnoxious paragraph in the specifications it is usually caused by the engineer having had a sad experience with one of our cutie-pie brethren. It is my opinion that in writing specifications the end result should be specified, and while proper safeguards against faulty manipulations should be inserted, there should be allowed sufficient latitude to permit a wide-awake, experienced construction organization to devise new and better schemes to produce the desired results at a cheaper price.

It has been suggested that a standing specification committee composed of engineers and contractors be appointed, and that each change in the specifications be approved by this committee before it is inserted in the new specifications. The contractors appointed on that committee would be in a good position to estimate the increase in cost caused by the contemplated change and the engineers on the committee could then decide whether the changes would be worth the additional money that would have to be spent.

Sample Specs

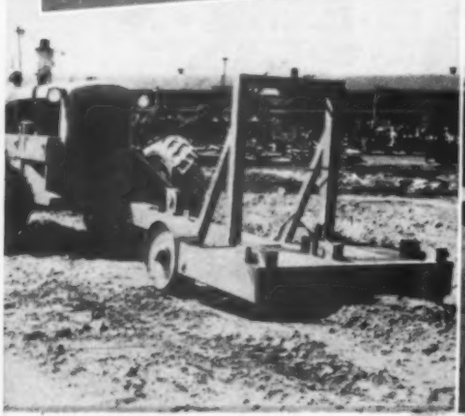
I would like to relate to you a couple of gems that were found in the highway specifications of a neighboring state. They show why specifications that describe minute details of operations are not at all satisfactory. In one of the specifications covering the drainage structures usually found on a highway project it was specified that 1-in. lumber be used when making the concrete forms for headwalls, beams and abutments. We ordered a car of shiplap which is commonly referred to as the commercial size 1-in. lumber. When it came on the job the engineer informed us that we could not use it as it measured only ⅞ in.! We had to go to the mill and have full 1-in. lumber sawed to satisfy the clause. Needless to say, the state paid more money for that type of concrete on the next job we received.

Another little gem in the same state

(*Continued on page* 76)

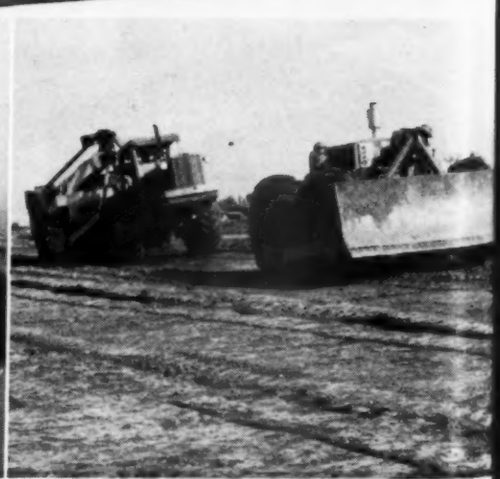
FAST ACTION with T

PULLS SCRAPERS — plenty of traction and loading power make the Tournadozer particularly adaptable for 4-wheel Scraper use. Tournadozer's wide work-range offers many profitable uses of rubber-tired power. Here, Tournadozer is coupled to drawbar of a Model LS Scraper.



ROOTING — can easily be combined with dozing because Tournadozer is available with two cable lines . . . one controlling the blade . . . another line from extra drum powers the Rooter. Both tools can be used simultaneously . . . neither interferes with operation of the other.

DEEP PLOWING — 180 h.p. . . . 4-wheel drive on rubber . . . "C" Tournadozer's ground-gripping rubber-tired traction plus instantaneous gear selection give you the power to keep a deep plow rolling steadily at high production. Here the rig is subsoiling in Soil Conservation work.



SNATCH-LOADING — Tournadozer is ideal for snatch-loading . . . gets in position fast . . . quick acceleration and powerful pull get Scrapers away faster. Also useful for pulling Rooters, Sheep's Foot Rollers, drawn graders, sprinklers, flat beds, logs, poles and other equipment.

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LeTOURNEAU "C" TOURNADOZER has 180 Horsepower—4 Wheel Drive—Speeds up to 15 m.p.h. Forward and Reverse—for PULLING • • • PUSHING • • • DOZING

Not only does the 180 h.p. "C" Tournadozer doze and push-load faster than slower moving crawlers . . . its high-speed and rubber-tired power give you added profits as a prime mover for Scrapers, Rooters, trailers or wherever pulling power is needed.

You have 180 horsepower harnessed to all four wheels. Big low-pressure tires (21.00 x 25) give ground-gripping traction for pulling through sand, mud, clay or muck — in snow . . . over ice. There are no expensive parts to grind and wear in abrasive materials. Four speed selections from 1.91 to 15 m.p.h. . . . plus "no-shift" constant-mesh Tournamatic transmission keeps you rolling in higher gear. Remember, too—Tournadozer on rubber lets you travel over pavement . . . cross tracks . . . work over factory floors . . . travel through city streets.

Let your LeTourneau Distributor show you what this versatile, high-speed, rubber-tired Tournadozer can do for you. See him today.

R. G. LeTourneau, Inc.
PEORIA, ILLINOIS

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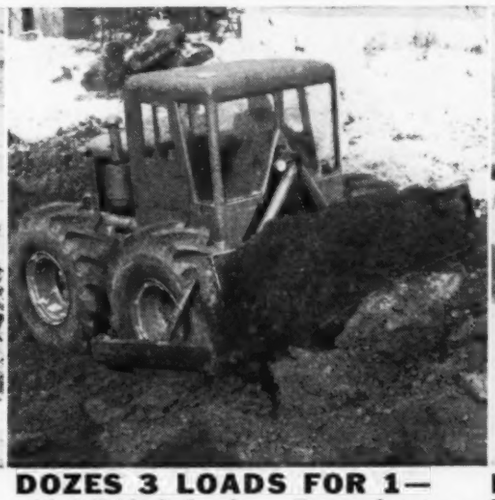
FASTER PUSH LOADING—Tournadozer's four speeds forward match Scraper speed without wasting power or rolling momentum. Constant "no-shift" power plus high-speed reverse mean increased maneuverability . . . more scrapers served per pusher . . . more pay loads per shift.



DOZES 3 LOADS FOR 1—with full blade load . . . Tournadozer completes a dozing cycle in one-third the time required by slow-moving crawler tractors. High-speed Tournadozer can travel 100 feet in the 10 seconds of time that is required for a crawler tractor to shift gears.

HIGHWAY HAULING—SNOW REMOVAL—Tournadozer has plenty of power to pull lowboys and other hauling equipment . . . can travel safely over any road surface, eliminates shipping and loading. When necessary, blade can also be used for effective snow removal.

LETOURNEAU PEORIA, ILLINOIS HIGH-SPEED RUBBER-TIRED TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

(*Continued from page* 72)
specifications required at least 400 ft. of subgrade ahead of a paver. Our company was one of the first to do subgrade operations at night, when there was no interference from the trucks feeding the paver. By morning we had 800 to 900 ft. of subgrade ready, and believe it or not, the project engineer stopped our paver at 3 o'clock in the afternoon because there wasn't sufficient subgrade ahead of the mixer. No amount of pleas that the specifications were not intended to apply when a night operation was contemplated was of any avail, and it took almost an act of the legislature to convince that gentleman that we were not violating the specifications.

A clear specification is also the best safeguard against the lawyer-type contractor who won't bid a job unless there is a joker in the specifications. When he finds one, he takes the job at a low figure and hopes to get his profits in the courtroom.

Uniform Inspection

A uniform field inspection is necessary to maintain good relations between engineers and contractors. A good construction organization will attempt to satisfy fair inspection at all times, and it is only fair that his competitors be required to build their jobs under similar conditions. It is an open secret in our fraternity that in one division of one of our neighboring states the bids run from 8 to 10% higher because of unrealistic inspection and lack of service. Every time an engineer is putting the screws to a contractor trying to enforce an unrealistic paragraph in the specifications he may hurt that particular contractor temporarily, but he is costing the state, or the political subdivision he is working for a lot more. Word usually gets around rather fast that a certain engineer is unfair and the bids on the future projects in that particular locality will reflect that attitude. Now, I am not trying to tell you that all contractors have taken the veil and that you can just turn them loose, but what I am going to tell you is that the successful contractor does not guess at his bids. He doesn't just take 10% off the published previous bids with the idea that if Jim Brown can do it for the estimate he can do it 10% cheaper. Now-a-days a successful contractor's bid is based on careful study of location, on carefully kept costs and on availability of equipment and personnel who are particularly fitted for that type of project.

Contractors' Preference

The next thing I am going to tell you will probably bring the ceiling down on my head [Ed. Note: The plaster didn't even crack] but here goes. Most contractors would rather work for a private corporation than a public body. The reasons are rather obvious. Engineers working for the public are naturally tied up by local, state and federal regulations, and of necessity have only a limited authority to meet emergency conditions that may crop up. Also, contractors have been able to get better service from the engineering departments of private corporations because construction programs around a plant usually interfere with operations and completion

(*Continued on page* 78)

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CAN PROVE RESULTS AND INCREASE PROFITS

Everyone wants results — dollars and cents results. Whatever your work, **"QUICK-WAY"** Truck Shovels show you results that increase profits in all their various uses.*

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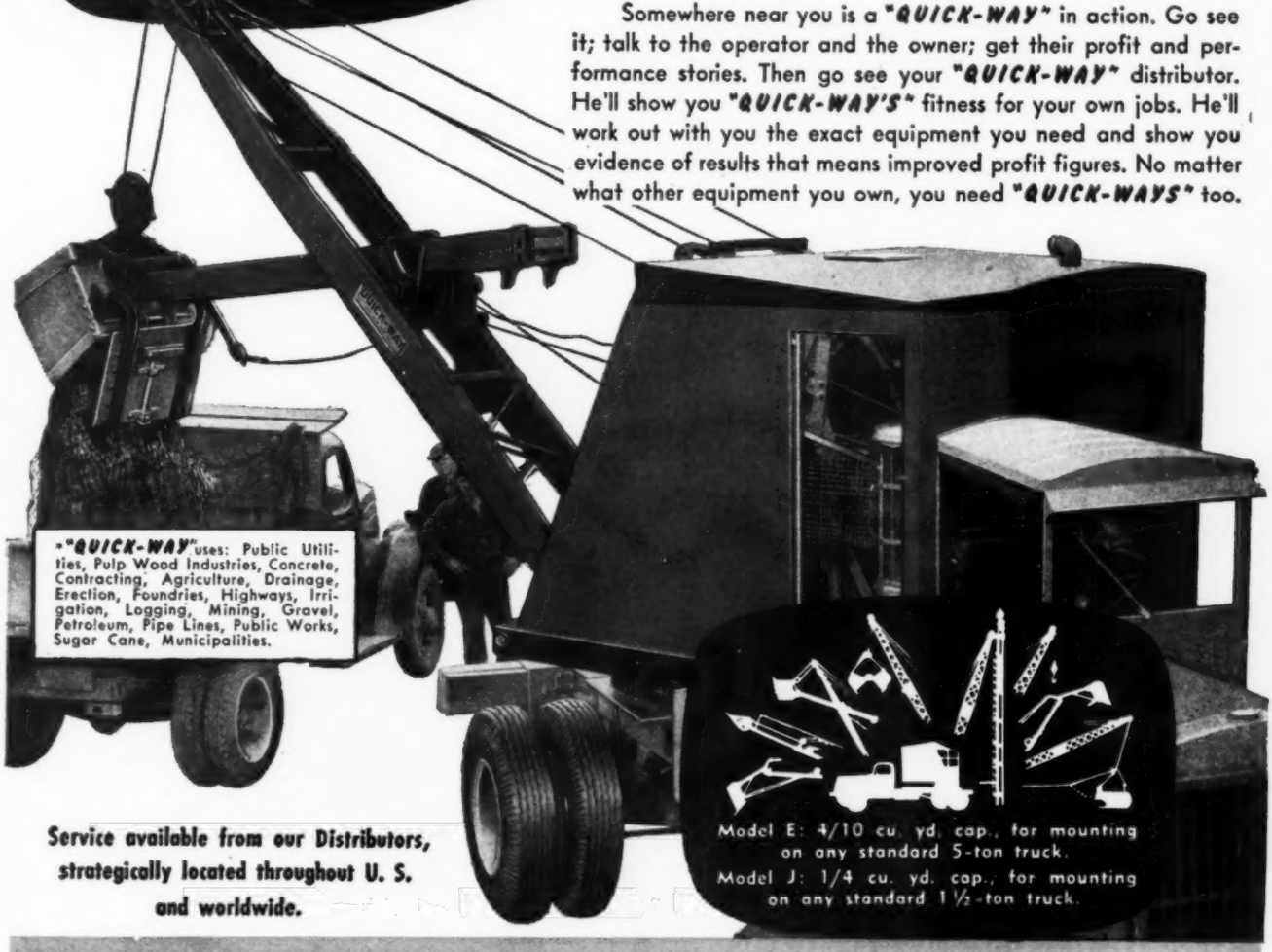
2 You'll spend less time "getting ready." **"QUICK-WAY"** construction is simple and your rig is convertible to any one of seven others in a few minutes, ON THE JOB.

3 You'll do more work in less time. Controls are simple and quick-acting, and **"QUICK-WAY"** hoist and swing action is fact. BALANCED speed gives bigger yardage.

4 You'll spend less time AND MONEY on repairs and maintenance. **"QUICK-WAY"** parts are simple and many vital parts are interchangeable. The entire machine is of quality steel construction—no iron castings.

HERE'S HOW YOU PROVE THEM...

Somewhere near you is a **"QUICK-WAY"** in action. Go see it; talk to the operator and the owner; get their profit and performance stories. Then go see your **"QUICK-WAY"** distributor. He'll show you **"QUICK-WAY'S"** fitness for your own jobs. He'll work out with you the exact equipment you need and show you evidence of results that means improved profit figures. No matter what other equipment you own, you need **"QUICK-WAYS"** too.



*"QUICK-WAY" uses: Public Utilities, Pulp Wood Industries, Concrete, Contracting, Agriculture, Drainage, Erection, Foundries, Highways, Irrigation, Logging, Mining, Gravel, Petroleum, Pipe Lines, Public Works, Sugar Cane, Municipalities.

Model E: 4/10 cu. yd. cap., for mounting on any standard 5-ton truck.

Model J: 1/4 cu. yd. cap., for mounting on any standard 1½-ton truck.

Service available from our Distributors, strategically located throughout U. S. and worldwide.

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.

DENVER, COLORADO

PIONEER IN POWER SHOVELS FOR TRUCK MOUNTING; STILL THE LEADER AFTER 29 YEARS

(*Continued from page* 76)
time is an essential part of the contract. The engineer in charge usually has the authority necessary to make decisions and changes in plans, thus avoiding costly delays and shut-downs.

While we are talking about time of completition I might say that highway engineers should consider very carefully the importance of completing a project. In designing the highway, they should keep in mind how much the new improvement is worth to the traveling public and avoid designing drainage structures like box culverts or fancy riprap walls in such a way that it deprives the motorist of an earlier use of this improvement. The time of completion requested should be realistic and should be enforced on a uniform basis. It is my belief that the time of completion computed on a working-day basis is the fairest way for both the contractor and the state.

I have previously mentioned "service from engineers." I don't know of any two things that cause more bad relations between contractors and engineers than failure to furnish sufficient personnel to service the job properly and failure to anticipate changes usually caused by insufficient information at the time the plans are made. We all know, of course, that practically all highway departments have lost quite a few of their experienced engineers to private enterprise. We have a huge highway program and we all know that it is being held back by insufficient personnel. It certainly is proper to suggest that an increase in the salary schedule and the elimination of political appointments will go a long way in attracting the caliber of men needed to put across this program.

In conclusion, I would say that the engineers and contractors are not as far apart as they once were. A common ground where mutual problems can be discussed is available to both parties. Let them attend each other's association meetings where recurring arguments may be discussed in a dispassionate way. As a parting thought I want to say to engineers that while you are still in the engineering profession be sure to treat all your fellow engineers with kindness and courtesy, because some day you may want to become, of all things, a contractor.

Turnpike Strike Dramatizes Truck Weight Issue

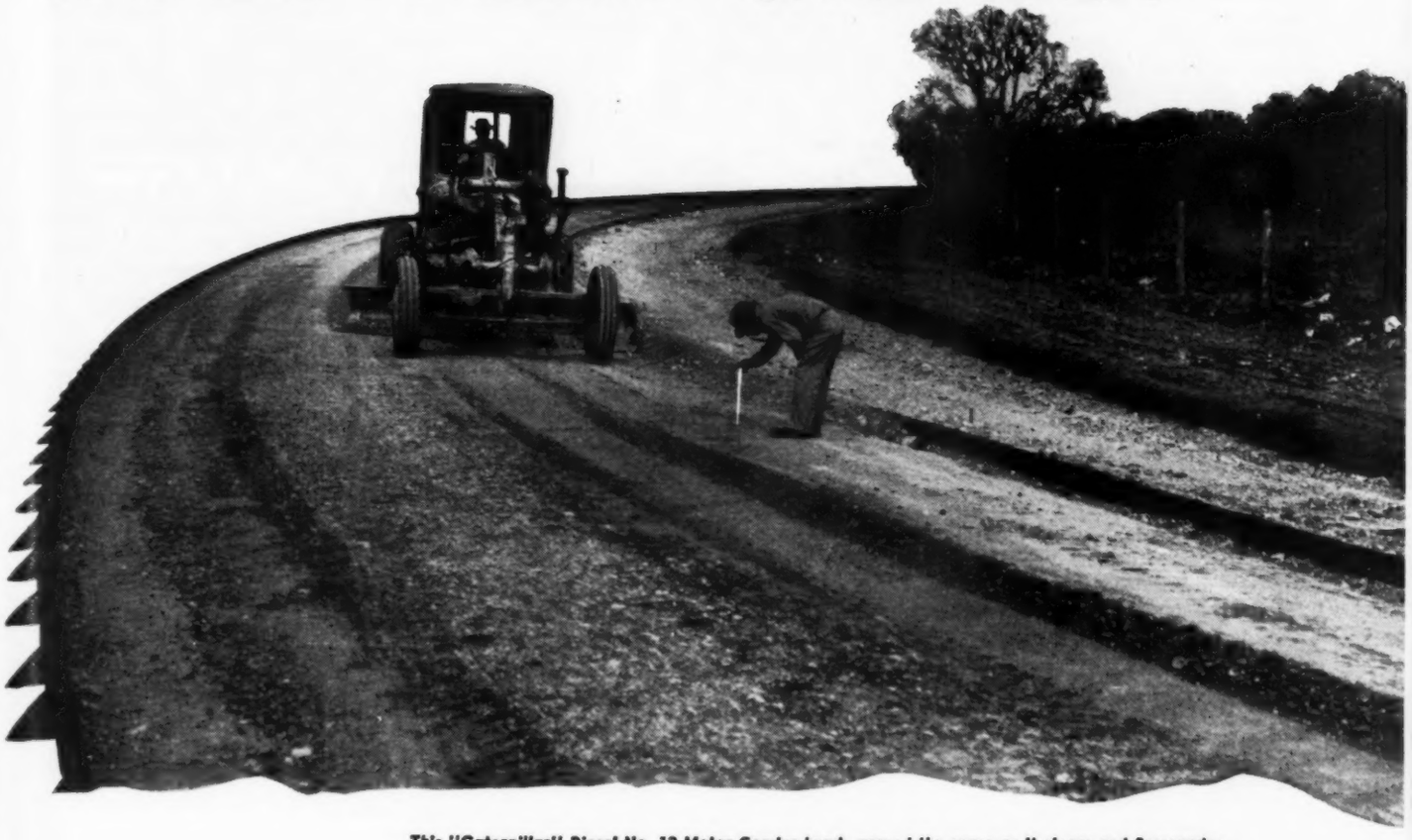
In the early morning hours one day this week, several trucks pulled off to the shoulder of the Pennsylvania Turnpike. Within a few hours the roadsides were lined with perhaps one thousand trucks, all idle in a protest against the Pennsylvania law which forbids loaded tractors and semi-trailers to weigh more than 45,000 lb. Many of the strikers were owner-drivers who depend on their truck's earnings for a living. Some of their trucks weigh 25,000 lb. unladen, leaving possible payloads of only 20,000 lb. on one of the world's best constructed roads. The protest failed, but it dramatized to the whole nation the effect of state size and weight law barriers—barriers which are even more restrictive of commerce in many other states.

Meanwhile, the South Carolina legislature completed action this week on a bill allowing 68,350-lb. maximum truck weights provided truck axles are spaced in accordance with state standards. Multiple axles are common on commercial vehicles, making pavement wear much less than might be expected from a vehicle's total weight.

●

Vehicle Tax Diversion $2,317,471,000—According to the National Highway Users Conference, diversion of highway user funds to non-highway purposes by the states totalled $2,317,471,000 for the 23-year period 1924-1946.

HOLD THAT GRADE!



This "Caterpillar" Diesel No. 12 Motor Grader heads around the curve as it clears and fine-grades for paving on an M. B. Killian and Co. job in San Antonio, Texas. Price of the standard model No. 12 Motor Grader, without cab, is $9020, F.O.B. Peoria, subject to change without notice.

Speaking of "Caterpillar" Diesel Motor Graders, H. G. Schwabe, Superintendent for M. B. Killian and Co., San Antonio, Texas, says, "They're the best machines for fine-grading ahead of the paver. These outfits can hold a grade within a quarter of an inch—and they're the only ones that can do it."

You'll hear the same thing about "Caterpillar" Diesel Motor Graders from road-builders all over the world. Rugged, dependable, these heavy-duty machines are known throughout the field for accuracy figured in fractions of inches. Add to that their large capacity, their hard-working versatility in highway grading, finishing and maintenance—from bank to bank.

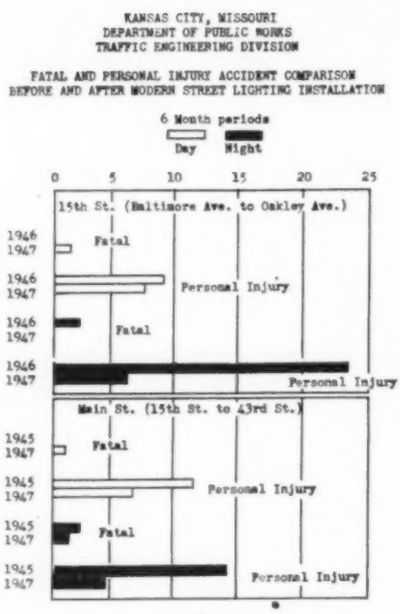
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

Backed by dealer service rated second to none, "Caterpillar" Diesel equipment offers you machines built to do more than their share of the work day in, day out, at lowest operating costs. Ask any user!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

Kansas City, Mo., Records Show Accidents Drop as Street Lighting Improves

Additional evidence of the benefits of modern traffic safety lighting was brought out in records of "before" and "after" modern street lighting installations in this city (see chart at right). City Engineer T. J. Seburn reports that careful analysis of Kansas City's street lighting problems, and the detailed plans made to solve them paid off handsomely in better light and increased safety. The city's relighting program involves replacing over 15,000 units, including gas lights, with approximately 13,500 modern types. The number, size and style of lighting units will be carefully correlated to the type of area—retail or wholesale business, and residential. For the complete story on this program, send for Item M-2481.



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Slow Driving Banned—A new Mississippi law provides no vehicle shall be driven at a speed of less than 30 m. p. h. on federally-designated routes where no hazard exists.

Don't Want Road Jobs—Only 511 of the 2,883 graduates this year of the civil engineering courses of leading U. S. engineering schools are interested in entering highway work, according to a survey by the American Association of State Highway officials.

9½% Over 1941

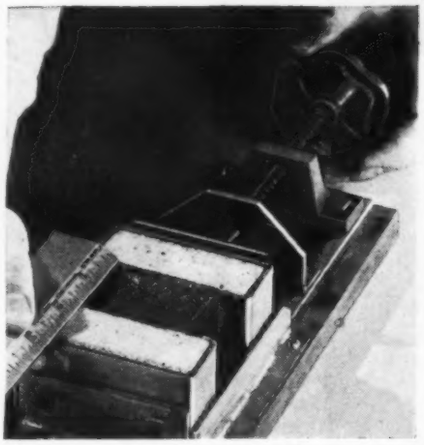
Motor Vehicle Travel—Motor vehicle travel on all rural roads during 1947, for the U. S. as a whole, was higher than in any previous year. The 1947 estimate is approximately 186 billion vehicle-miles, an increase of about 9½% over the previous high of 170 billion vehicle-miles estimated for 1941. Travel on main highways in 1947 followed the same trend as on all rural roads, the estimate being 137 billion vehicle-miles, an increase of almost 12% over the 1941 estimate of 123 billion vehicle-miles. Local road travel in 1947 also was heavier than in any previous year.

●

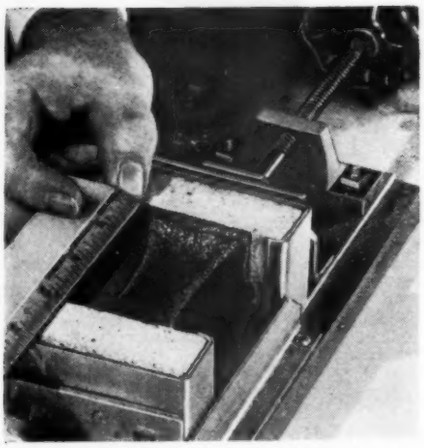
37,402,230 Motor Vehicles Registered 1947—A total of 37,402,230 privately-owned automobiles and commercial vehicles were registered in the United States in 1947. This was an increase of 3,456,413 or 10.2% above 1946 registrations, and was 2,930,085 or 8.5% more than the 34,472,145 private and commercial vehicles registered in 1941, the previous peak year. The 1946 total was 10.8% above the 1945 registrations.

We S-T-R-E-T-C-H-E-D a point...

Flintseal is poured between cement mortar blocks for testing.



Blocks are extended ⅛ inch per hour.



Extended double to 3 inches, Flintseal maintains perfect bond.

...to PROVE one!

● They keep getting bigger! The Consolidated-Vultee B-36 can carry an atom bomb anywhere in the world and return. Sky giants like this must have concrete runways. Flintseal Joint-Sealing Compound increases service life and reduces maintenance cost for concrete paving.

● With more traffic than ever before on our highways, maintenance becomes even more important. Flintseal helps cut maintenance to the bone, because its bond remains firm and tight through repeated cycles of expansion and contraction.

It happened like this.

We were demonstrating the extensibility of Flintseal* Joint-sealing Compound as required by Federal Specification SS-F-336a . . . (5 cycles of extension from 1 to 1½ inches at 0° F. and recompression at room temperature).

Then, showing what Flintseal would really do, we extended to 3 inches. Three times its original width instead of half again as wide.

And the bond of Flintseal to the test blocks remained as firm as ever!

We admit that's stretching a point. Joint-sealing Compound probably would never be called on to perform like that. But isn't it a comfort to know that materials you use have that *additional* factor of adhesion and safety?

You get that and more with Flintseal. It's a *rubber-bearing, thermoplastic* joint-sealing compound especially developed by Flintkote to give you four important advantages:

1. Seals joints effectively against infiltration of moisture and other foreign matter through repeated cycles of expansion and contraction of concrete slabs.

2. Adheres firmly to concrete . . . without use of primers. Remains extensible and compressible.

3. Maintains resilience . . . does not become brittle and crack in coldest weather, nor will it flow in hottest weather.

4. Can be melted and applied quickly and easily in equipment especially designed to permit safe, economical handling.

For full details and application data on Flintseal, write today.

*Trademark

THE FLINTKOTE COMPANY, 30 Rockefeller Plaza, New York 20, New York

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL

Flintseal

HOT-POURED JOINT-SEALING COMPOUND

★ Largest cut, about half way down—the kind of cut where an outfit can really roll

292,000 Cu. Yd. Earth Moved in 23 Days

by this outfit on Silver State Construction Co.'s U.S. 40 contract in Elko County, Nevada

Contractor also set something of a record by producing 27,000 tons plant mix for asphaltic surface at average rate of 178 tons per hour with 3,000-lb. plant

PROJECT: Relocation of a section of U.S. 40, Elko County, Nevada, approximately 16 miles in length, extending from Halleck to Deeth. Grade, drain; plant-mix asphaltic surface on pit-run gravel base. Consists of four-lane undivided roadway, minimum graded width 40 ft., designed to most modern inter-state (80 mph.) standards. The job is fenced on both sides with four strand barbed wire fencing for approximately thirty miles.

Let to Silver State Construction Co., A. D. Drumm, Jr., owner, of Fallon, Nev. Contract No. 686 awarded May 10, 1947.

Outline: Work began May 15. Practically all work completed by Oct. 25, leaving only clean-up items, a short section of seal and screenings, and paving of cut ditches. Quantities in project include 590,000 cu. yd. roadway excavation, 162,000 tons pit-run gravel base, 76,000 tons 1" maximum crushed gravel surface, 27,650 tons hot plant-mixed asphaltic surface, 600 cu. yd. class A concrete for structures. Job largely completed in 5 months with about 3 months at peak production. Production was achieved on a basis of single 9-hr. shift, six days per week.

Detour: A 16-mile detour roadway surfaced 20 ft. wide with oil mix was necessary, and had to be put in before the main job started.

Grading: Began June 10, completed September 29. Earth production at peak of job approximated 15,000 cu. yd. per day; 292,000 cu. yd. was moved in 23 days during July. Earth moving was accomplished with six Super C Tournapulls with Cummins power, nine D-8 Caterpillars, one D-7 Caterpillar and two "60" gas Caterpillars. The 60's pulled four sheepsfoot drums in units of two in tandem. The D-8's were used with four Model "W" LeTourneau scrapers and two Model J-13 LeTourneau scrapers. Three D-8's were equipped with dozers, two being used as pushers for "W's" and Tournapulls. Largest cut, 140,000 cu. yd.; largest fill, 115,000 cu. yd.

Culverts: About 5,000 ft. of corrugated metal culvert was installed and several concrete boxes built as cattle passes.

Gravel Base: The Super C's used on grading were also loaded by a Model Six Northwest Shovel for applying gravel base. All gravel base was weighed on 40-ton Winslow scales. Type 1 gravel production reached 5,000 tons a day at its peak. Type 2 gravel production and plant mix surfacing aggregates averaged 4,000 tons per day through the gravel plant. Additional shovel equipment on the job included a ½-yd. Northwest gas and a 1-yd. Link-Belt diesel. There were two Buffalo-Springfield tandem rollers, one being 3-wheeled.

Plant-Mix: Asphaltic plant-mix surfacing was produced by 3,000 lb. Madsen Plant and was laid with Barber-Greene paver. The hot plant production was acclaimed as a record, as the average for the entire 27,000 tons was 178 tons per hour. It exceeded

★ Silver States Construction Co.'s equipment bunched in the big cut

NOTICE OF ADVERTISEMENT FOR BIDS On One Subcontract Covering THE COLLECTING and DISPOSAL of REFUSE at OAK RIDGE, TENNESSEE

"Commencing April 19, 1948, the Roane-Anderson Company (Agent of the Government) will issue invitations to bid on one subcontract covering the collecting, transporting, and disposing of all garbage, ashes, rubbish and other refuse from Residences, Dormitories, Commercial Buildings, Schools, and other facilities of the Oak Ridge Area, Oak Ridge, Tennessee (Population approximately 36,000) for either a one-year period from July 1, 1948, through June 30, 1949, or a two-year period from July 1, 1948, through June 30, 1950."

"Prospective bidders must: (i) have had experience in garbage and refuse removal and disposal operations or equivalent experience as may be approved by the Roane-Anderson Company; (ii) be able, in the event they should be the successful bidder, to furnish a Performance Bond for 100% of the total subcontract price; (iii) have on hand, prior to the commencement date, in the event they should be the successful bidder, cash assets sufficient in the opinion of Roane-Anderson Company, to cover sixty (60) days' operation; and (iv) have in their possession at time of commencement of operation, in the event they should be the successful bidder, all necesary equipment to be used exclusively in performance of this work."

"Bids will be received until *2:00 PM EST, May 20, 1948*, at which time the bids will be publicly opened."

"All qualified bids will be considered not only on the lowest bid offered but on the applicable experience, financial assets, integrity of the bidder and ability to obtain equipment and employees. The Roane-Anderson Company reserves the right to reject any and all bids received."

"Requests for additional information, inspection of site or invitations to bid should be made to Roane-Anderson Company, Concessions Division, P. O. Box 456, Attention Mr. Harold B. White, Oak Ridge, Tennessee, or telephone Oak Ridge No. 5861, Extension No. 4640."

200 tons per hour for several days and top day was 2,042 tons. During these high production periods it was necessary to have two operators on the mixing platform. Hauling was done with 20 Ford dump trucks.

Water: Hauled in six 2,000-gal. trucks, served by five 4-in. pumps.

Blading and Finishing: Performed by four Model 12 Caterpillar patrols. Oil-mix detours and shoulder material processed with a Gardner road mixer.

Servicing: Two complete portable pressure greasing outfits and a fuel servicing unit worked this job. A 3-stall garage with traveling overhead trolleys was built at the job site. Miscellaneous equipment included two arc welders, two concrete mixers, a vibrator, etc.

Personnel: Workers were housed and fed in a 100-man camp complete with cook houses. Superintendent on the job was F. G. Riley; gravel plant foreman, Early Ryan; grading foreman, J. R. Fields; resident engineer for the Nevada state highway department, Dale Rose; division engineer, Julian Glock.

●

Over 2,200 roadside advertising signs were removed from highway rights-of-way in New York State during 1947 as a means of increasing highway safety.

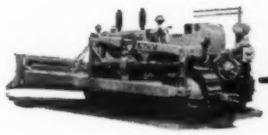
●

Engineers Wanted for Federal Service

Civil Service examinations have been announced for filling engineer positions in various Federal agencies in Washington, D. C., and in the Bureau of Reclamation. Applications for engineer positions in the Bureau of Reclamation, which pay $2,644 a year, are being accepted by the Executive Secretary, Central Board of U. S. Civil Service Examiners, Bureau of Reclamation, Denver Federal Center, Denver, Colo. The salaries for engineer positions in Washington, D. C., range from $3,397 to $5,905 a year. Age limits for the $2,644 positions in the Bureau of Reclamation are 18 to 35 years and for the higher level positions in other Federal agencies from 18 to 62 years. These age limits are waived for persons entitled to veteran preference. Detailed information about all requirements is given in Announcement No. 13-1-2 (1948) for Bureau of Reclamation positions, and Announcement 95 for positions in Washington, D. C. Announcements and application forms may be secured from the U. S. Civil Service Commission, Washington 25, D. C., from Civil Service regional offices, or from most first- and second-class post offices.

The *Control* You Need to Keep Dirt on the Move!

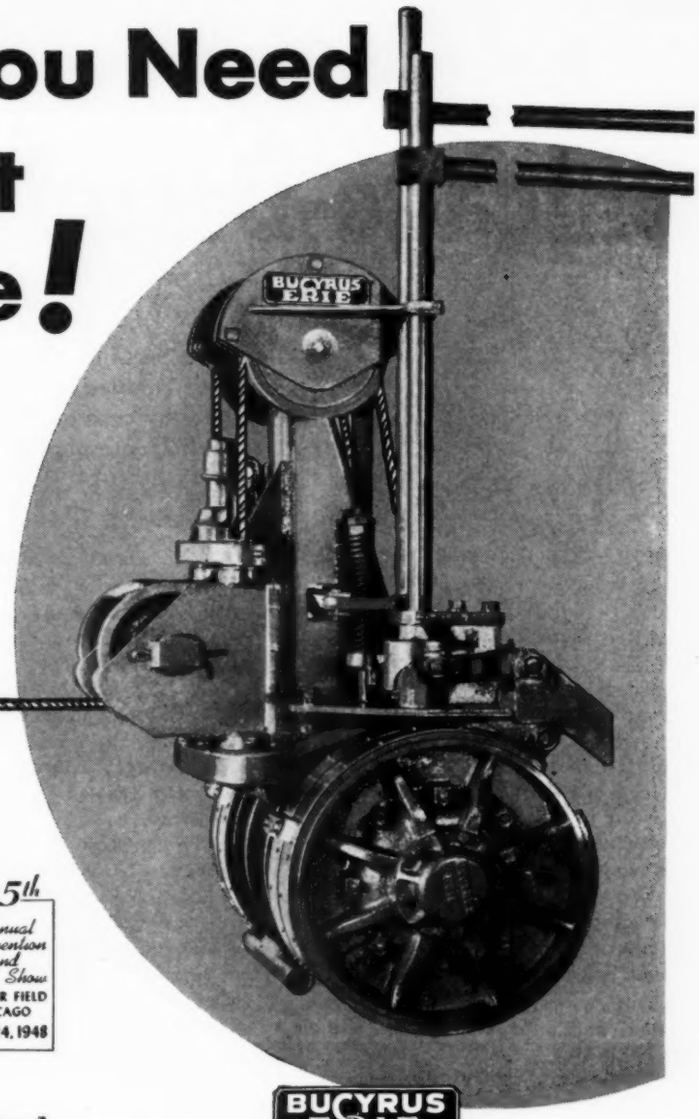
SCRAPERS



BLADE EQUIPMENT

RIPPERS

BETTER ROADS FOR A BETTER WORLD — 45th Annual Convention and Road Show — SOLDIER FIELD CHICAGO — JULY 16-24, 1948



BUCYRUS ERIE

SMOOTH, accurate, positive in action, and dependable day after day . . . that's control with Bucyrus-Erie Power Control Winches. Operators say they're the easiest handling winches on the market . . . that adjustments are simple and lasting . . . that maintenance is easy. Owners report that the cost of maintaining Bucyrus-Erie Power Control Winches is low . . . that they keep equipment operating at its best . . . and that — most important of all — they're BIG factors in keeping dirt on the move!

Investigate the single and double drum, front and rear-mounted models offered for use with International crawlers. See your International Industrial Tractor Distributor.

BUCYRUS-ERIE COMPANY, SO. MILWAUKEE, WIS.

For BUCYRUS ERIE TRACTOR EQUIPMENT See Your INTERNATIONAL Industrial Tractor Distributor

Power Control Winches

- DOUBLE-DRUM rear mounted for all sizes of International Crawler Tractors; SINGLE DRUM front mounted for TD-24
- SIMPLE PLANETARY DRIVE
- ADJUSTABLE LEVERS
- EXTERNAL BRAKE SURFACES
- INTERCHANGEABLE REVERSIBLE BANDS
- MOULDED BRAKE LININGS
- ANTI-FRICTION BEARINGS
- SINGLE BEARING ADJUSTMENT
- SINGLE BAND ADJUSTMENT
- SINGLE OIL BATH LUBRICATION
- TRANSPARENT OIL LEVEL SIGHT

106T48

Progress Report:

Chicago-Detroit Expressway

Condensed from a talk at the Purdue 1948 Road School by Samuel C. Hadden, consulting engineer, Indianapolis. This article shows by case example something of the problems involved in inter-city route planning.

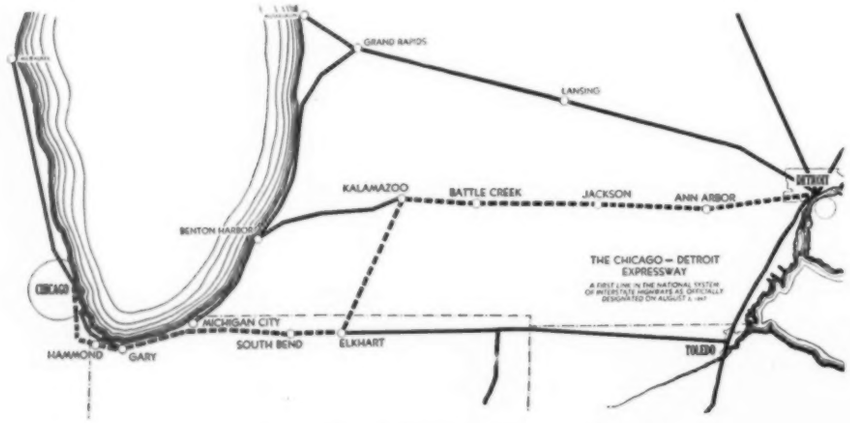
THE Chicago-Detroit expressway, first conceived in 1926 by the Chicago regional planning association and now being urgently advocated by the Automobile Club of Michigan and the Chicago Motor Club, is planned as an important link in the national system of interstate highways. In addition to joining two metropolitan cities it will furnish convenient access to many intermediate cities, which will contribute most of the traffic. The highway as presently conceived is expected to draw more closely together the cities of southern Michigan and northern Indiana, which exchange goods and services.

The general route has been determined and approved by the Illinois, Indiana and Michigan highway departments and the Public Roads Administration. Millions of dollars have already been spent on advance engineering for a 10 to 15 year construction program. Some surveys and plans have been completed, some right-of-way bought and cleared and a dozen construction contracts awarded.

Existing Routes

Although still in fair physical condition the present Chicago-Detroit roads are overloaded, obsolete, unsafe and uncomfortable. These roads—US 12, US 112, M-60 and US 20 and 24—have played an important part in the design and location of the new expressway. See map for their location with respect to the projected expressway.

The shortest existing route, 271-mile US 112, is crooked and hilly and serves only small towns. M 60, only two miles longer, has good line and grade, but Three Rivers is the only important community it serves between Jackson and Niles. Although US 12 serves many larger cities, its design is obsolete and it is 10 miles longer than US 112. For the greatest part of their length all of these roads have two-lane roadways with sharp curves, steep grades, short sight distance, narrow right-of-way and many highway and railway grade crossings. Some of the shoulders are very narrow, traffic is not divided and access is not controlled.



★ Broken line shows route of the Chicago-Detroit Expressway, which is being sponsored jointly by the Automobile Club of Michigan and Chicago Motor Club. (Map courtesy latter.) Black lines indicate other roads to be built in the National System of Interstate Highways, as designated by the PRA

Serving Wayside Cities

It is very desirable that each of two rows of cities along existing routes be served by the new expressway. One row in Indiana includes Hammond, Gary, La Porte, Michigan City, South Bend, Mishawaka and Elkhart. The other, in Michigan includes Detroit, Ann Arbor, Jackson, Marshall, Battle Creek and Kalamazoo. Naturally, both states want as much of the expressway mileage as possible. Officials and interested parties of the two states met and discussed their mutual problem agreeably.

Expressway traffic in leaving downtown Chicago will use the Outer Drive to Jackson Park; Stony Island Ave. and its extension, Doty Ave., to 130th St., South of 130th St. the fully planned Calumet Superhighway will be a part of the expressway as will the Tri-State Superhighway from its intersection with the Calumet to the Indiana State line at 171st St.

On the Illinois section, right-of-way has been acquired, plans have been drawn, and twelve contracts awarded, and the highway departments of Illinois and Indiana have worked out state-line connection details.

Indiana Location

Following the route of the long proposed Tri-State Highway, 18½ miles of the expressway will extend from the Illinois-Indiana line to US 20 in Porter County. From there the existing multi-lane pavements of US 20 and Indiana 2 will support traffic to the South Bend-Mishawaka-Elkhart area. In Indiana, the first mile from the Illinois line to Calumet Ave., is called the "high hurdle." Here Indiana has moved more than 100 houses and clearing will be completed by early summer. Plans are nearly complete for interchange and separation structures, some to be contracted this year.

(*Continued on page* 88)

A PIONEER of Small Excavating Equipment . . . AND STILL A LEADER!

GENERAL SHOVELS, DRAGLINES, CRANES, ETC.

Diesel, Gas, and Electric Powered . . . Wheel and Crawler Mounted. ½ and ¾ Cu. Yds.

Generals have always been known for speed . . . for strength and power . . . for flexibility . . . for the ability to take punishment day after day and still give uninterrupted performance. Constant improvement of the product through new engineering developments, has added to that reputation.

A typical General achievement is the self-propelled one-man, one-engine crane, on rubber. Similarly, the new General crawler-mounted shovels, cranes and draglines, etc., are making an enviable record of out-performing all other types of equipment of comparable rating. Write today for the latest details.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO.
EXCAVATOR
MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

Report on Michigan Road Needs Made Public

Twelve to 15-year recommended program, totaling more than two billion dollars, to require 53% to 100% increase in highway revenue; 46% of state's total road and street mileage found deficient in 150-page report characterized as "overwhelming" in its engineering thoroughness and logical and attractive presentation

A REPORT on Michigan's highway needs and a long-term program for the improvement of roads and streets throughout the state has today been presented to the Governor and the public. The study and resulting 150-page report was initiated and carried through to completion under the auspices of the Highway Study Committee of the Michigan Good Roads Federation. While the committee here presents various fiscal suggestions and recommendations, it intends at a later date to formulate more detailed recommendations.

The report, entitled "Highway Needs in Michigan: an Engineering Analysis", is presented in dignified yet appealing and readable form with the help of promotional and printing specialists. The report finds that 46% of Michigan's road and street mileage is now deficient and requires improvement. The estimated cost of remedying these accumulated critical deficiencies is $1,434,910,687. While the needed expenditures are divided almost equally between rural and urban roads, 5/6 of the expenditures are needed on general-service roads (rural and urban state trunklines, primary county highways, and major city streets) which comprise less than ⅓ of the state's total road and street mileage.

The determination of these critical deficiencies was made through the formulation of design standards and the application of standards to the existing roads and streets.

In the evolving of such a long-range program this report notes that there must be added (1) annual replacement needs to take care of roads wearing out during the period, and (2) annual maintenance needs.

Cost of Long-Range Job

While the report presents costs of meeting the expressed needs within various periods of from 2 to 20 years, it recommends a long-range program of from 12 to 15 years. A 12-year program would cost $179,141,000 annually, and require $73 million a year in additional highway revenues. A 15-year program would cost $158,444,000 annually, including an additional $51 million a year. Details can be summarized in the accompanying table.

Raising the Funds

The report states that all additional funds cannot, and should not, be raised through motor vehicle taxation. "If the principal source of additional motor vehicle revenues were to be an increased gasoline tax, a total tax of 9 cents a gallon would be required to finance all roads and streets for a ten-year program period. For the 12-year period, a rate of nearly 8 cents would be required, and even for the 15-year period, more than 6 cents a gallon." State-collected motor vehicle revenues should be spent mainly on general-service roadways. Substantial responsibility for financing local roads and streets must be met from local taxes.

The report recommends that the present statutory distribution of state highway user taxes to the state highway department, counties, and cities be repealed and a new formula, based on needs as set forth in the report, be enacted. Other recommendations provide for strengthening and improvement of highway administration (including supervision over and reports of local expenditures of state-collected highway funds, a biennial report to the Legislature by the state highway commissioner on the progress of the over-all program, including accounting of all expenditure and proposed future program), wider application of various traffic measures to obtain maximum service from existing roads and streets in order to hold construction needs to a minimum, and legal reclassification of the highway system on the basis of traffic carried.

The report contains chapters describing the importance of highway transportation to Michigan, the development of the state's roadways, a history of their financing. The work of the Study Committee has been conducted under the direction of J. P. Buckley, Engineer - Director, aided throughout by the staff of the State Highway Department.

Progress Report: Chicago-Detroit Expressway

(*Continued from page* 86)

Michigan Location

From Elkhart, Indiana, the expressway will turn north to Kalamazoo.

Between Chicago and Kalamazoo there will be two interstate routes. The Elkhart-South Bend route previously described is an integral part of the Chicago-Detroit Highway. The other route, by way of Benton Harbor, will not be a part of the expressway, but will be built to Interstate standards. Which of these two will be built first has not been decided.

Between Kalamazoo and a point near Ann Arbor, the expressway will follow US 12 closely. Grading and drainage work for the east end of the Jackson by-pass has been started and four bridges will soon be advertised. Nearly all right-of-way has been obtained on this by-pass. Right-of-way is also being acquired for the Kalamazoo by-pass. By-passing Ann Arbor on the south and west, the new route will intersect US 112 two miles southwest of Ypsilanti, and then use the Willow Run and Detroit Industrial Expressway 30 miles to the Detroit city limits.

One important location decision has not yet been made. Will the expressway go through or by-pass South Bend? The hope is expressed that it will by-pass the city. Otherwise, there may be a long delay and ultimate rejection of the route selected.

Michigan Highway Study Report—Estimates of Costs and Receipts

Length of Program	Annual Cost	Total Cost	Annual Revenues* (Present Source & Rates)	Annual Revenue Deficiency	Total Revenue Deficiency
10 yrs.	$200,777,000	$2,007,770,000	$104,555,000	$96,222,000	$962,220,000
12 yrs.	$179,141,000	$2,149,692,000	$105,776,000	$73,365,000	$880,380,000
15 yrs.	$158,444,000	$2,376,658,000	$107,426,000	$51,018,000	$765,270,000

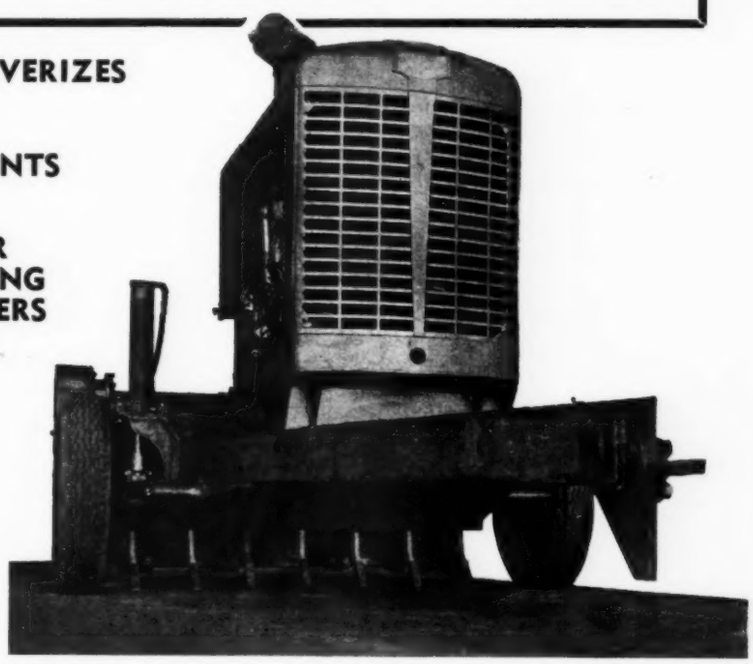
*1948 estimated highway revenue—$96,834,000.

The WOOD PREPARIZER

IT

SCARIFIES AND PULVERIZES OLD OIL MAT, ASPHALT AND MACADAM PAVEMENTS

PREPARES SOILS FOR BLENDING OR MIXING WITH LIQUID BINDERS OR SOIL CEMENTS



THE WOOD PREPARIZER IS A HEAVY DUTY MACHINE FOR ROADBUILDERS AND MAINTENANCE FORCES.

ENGINEERED AND BUILT TO WITHSTAND LONG AND HARD USAGE. UNEQUALLED PERFORMANCE AND ECONOMY

- **THE WOOD PREPARIZER** can be used on any pavement that could be scarified with a motor patrol. It will scarify and pulverize in one operation making it possible to reuse aggregate in the old wearing mats in the reconstruction of these roads.
- Mounted on Hydraulic Jacks insuring perfect depth control making it possible to peel off the mat and pulverize it without disturbing the road bed.
- A perfect machine for conditioning all types of soils in base courses or wearing surfaces on all mixed-in-place jobs.

DESIGNED FOR TOWING WITH A CRAWLER TYPE TRACTOR

BUILT BY THE MANUFACTURER OF THE FAMOUS WOOD ROADMIXERS

PRODUCED IN 2 SIZES

Model P-400—4′ Width
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Write for Descriptive Literature and prices

ROADBUILDING EQUIPMENT

WOOD MANUFACTURING CO.

BOX 620, 6900 TUJUNGA AVENUE • NORTH HOLLYWOOD, CALIFORNIA

Bridge Trusses Moved 75 Miles

SIX steel trusses from a bridge currently being replaced were moved 75 miles over the highways by the state highway department of Michigan with the help of Robinson Cartage Company of Grand Rapids. While the units involved were not particularly heavy (7 tons) their length of 108 ft. and height of 12 ft. made their haulage somewhat of a special job.

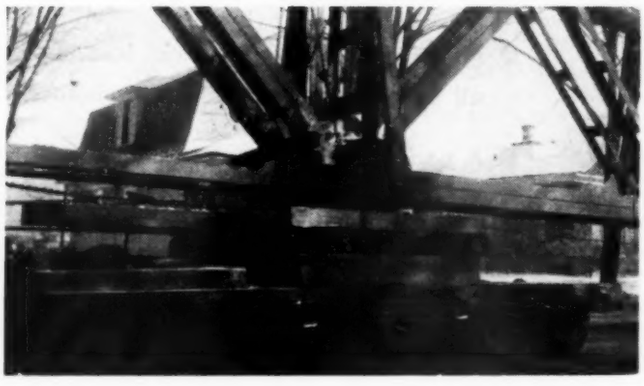
The original structure of this bridge, erected in 1919 over the Grand River at Ionia, Michigan, consisted of three spans of 108 ft. each with an 18-ft. roadway and a 4-ft. sidewalk on one side. The steel was in good enough condition to warrant re-use of the trusses, and the highway department decided to salvage them for re-erection at a crossing of the Muskegon River near Muskegon, Michigan.

The procedure was to remove the old concrete deck, and match-mark and take down the floor system. Each of the six trusses was then removed in one piece and loaded on a low-bed trailer and a four-wheel trailer in an upright position for haulage to a storeyard, where the trusses will await the award of contract for the new bridge.

One end of a truss was placed on the trailer, with support at the first panel point. The rear end of the truss was supported on the four-wheel unit with bearing at the first panel point at the back end. Two trusses were hauled in one load as shown in the accompanying photos, this load having an overall length of 130 ft. This is a special load as to length, and necessitated an escort by state police.

Truss units were lifted by a crane using a slip, the trusses being picked up at the center of the top cord. Another crane at the storage site found it easy work to unload the trusses.

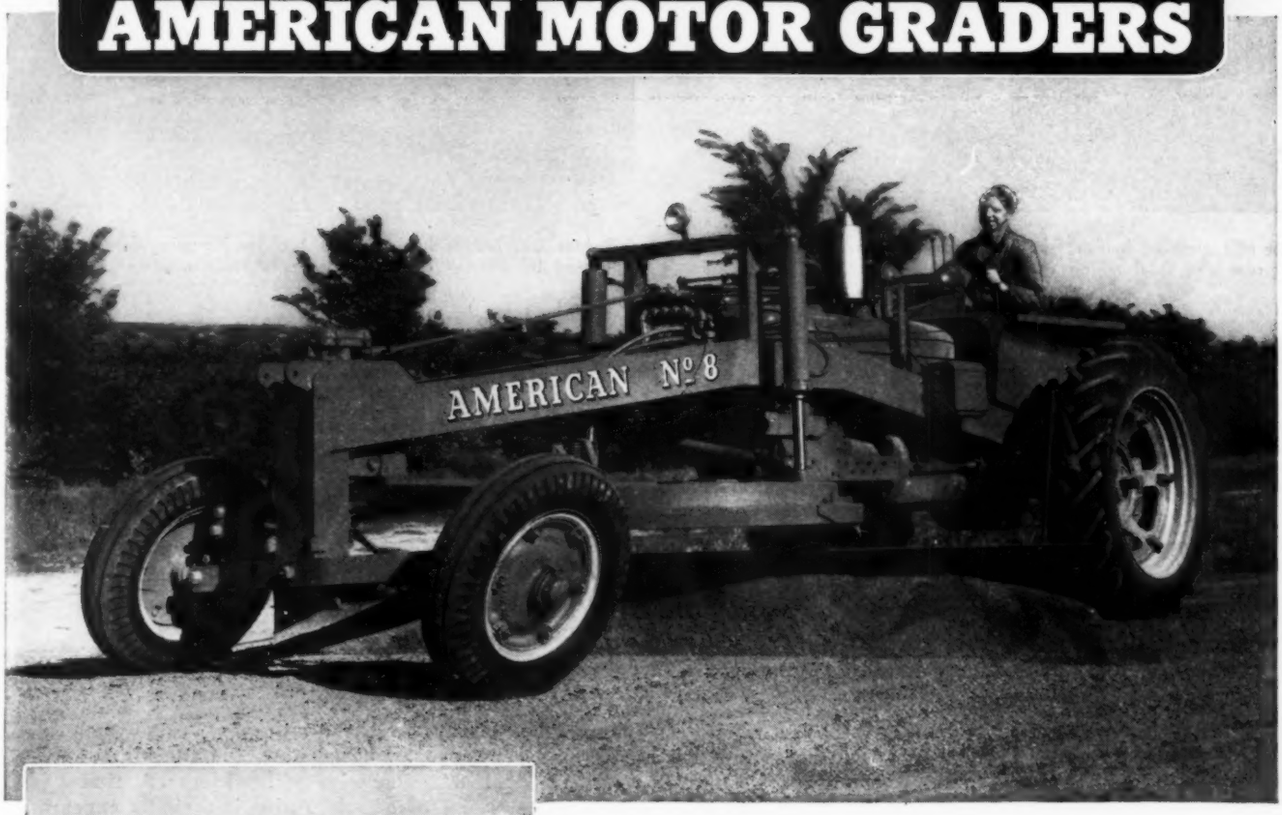
★ Loading trusses out at Ionia



★ Details of trailer support

★ Trusses being moved from Ionia to Muskegon

CUT YOUR JOB COSTS with AMERICAN MOTOR GRADERS



The extra power of **AMERICAN** Motor Graders moves heavy windrows with ease. Plenty of clearance insures proper flow of material along the blade.

Exclusive hauling scraper is ideal tool for filling washouts, bridge approaches, and low spots.

Large Machine Performance...

Small Machine Economy

With the AMERICAN No. 8, you can build and maintain roads with the speed and efficiency of much larger machines . . . AT MUCH LESS COST!

AND HERE'S WHY!

The AMERICAN No. 8 is powered by the model M engine . . . one of the most efficient ever tested. Smooth, dependable power is always at the operator's fingertips.

The AMERICAN No. 8 is so easily handled. Positive acting brakes, easy steering, short turning radius, sensitive hydraulic controls, unobstructed visibility—all of these features mean greater capacity for turning out work.

The AMERICAN No. 8 is versatile. Maintaining, ditching, scarifying, snow plowing, mixing blacktop—all these jobs can be handled with ease. The exclusive front-end hauling scraper can dig, scoop and carry a large load wherever needed.

When you buy the AMERICAN No. 8, you save money on initial cost, operating expense, and upkeep. See your dealer today or write American Road Equipment Co., Omaha, for complete information.

See the AMERICAN No. 6, the sensational new motor grader with a high-lift front end loader . . . designed for municipal use.

STAMINA - POWER - ECONOMY

AMERICAN ROAD EQUIPMENT CO.
OMAHA, NEBRASKA

★ Mill crossing bridge, showing midspan Warren truss box girder and steel railing

★ Robles Del Rio Bridge, showing two steel grating lanes separated by 3-ft. wide precast concrete horse-walk

California's War Surplus Bridges

Army-surplus portable steel bridges give new state and county road bridges economical readymade "backbones"

By H. D. Stover

Senior Bridge Engineer,
California Division of Highways

THE California division of highways has found it economical to use surplus Army fixed-type portable steel highway bridges in permanent structures on state and county roads.

Recently completed Mill Crossing bridge is located on a service road across Lagunitas Creek in Samuel P. Taylor State Park, Marin County. Designed for an H10 loading, the timber-decked 72-ft. main span consists of two structural steel box girders built of light angles welded to subdivided Warren trusses. The girders were furnished in sections 12 ft. long, the sections being bolted together with 1¼-in. bolts having a minimum yield point of 40,000 p.s.i. When assembled, the bridge has a 4-ft. truss depth and provides a single 10-ft. clear roadway.

As built for the Army these bridges do not have railings. The steel railing provided consists of a 6" x 4" x ⅜" angle top rail and a 4-in. 5.4-lb. channel intermediate rail supported on U frames made of 6-in. 12.5-lb. I-beams. The U frames were reinforced at the corners by ½-in. gusset plates and were welded to the top chords of the trusses.

Nailing strips were bolted to the top chords of the trusses and the 3-in. deck planks were nailed to them with two 5½" x 5/16" double-grip spikes.

The bolts connecting the lower chords of the girder sections were reinforced by welding a 3" x ½" x 1' 8" plate across the joint.

Big Sur River Bridge

Another war surplus bridge is now under construction across Big Sur River in Pfeiffer Redwood State Park. Designed for an H20 loading, this bridge consists of two parallel 125-ft. bridges and two parallel 12-ft. ramps—a total length of 149 ft. It provides a two-lane divided highway with 10-ft. clear roadways. The twin superstructure is supported on concrete piers and abutments. Each bridge is composed of two 2' x 6' steel box girders built in sections 12½ ft. long. Trusses are the double Warren type.

The girders are supported 12½ ft. from each end, thus giving a 100-ft. main span. The overhangs, plus the ramps, form the 24' 5" end spans. The launching rollers, furnished with the bridge, were modified to provide the bearing assemblies at the ends of the main span. This method of supporting the girders shortened the span and reduced the stresses in the lower chords. Hence it was not necessary to reinforce the bolted connections, as at Lagunitas Creek.

The deck planks were laid directly on the upper chords of the trusses. Each plank was nailed to the wheel guard with one ⅜" x 9" spike. By use of the deck clamping beams furnished with the bridge each plank was bolted to the trusses at approximately 6-ft. centers. A timber rail, adzed to give it a rustic appearance, was bolted to the outside wheel guards.

County Bridges

Monterey County, Calif., has under contract the construction of six bridges built from war surplus materials, with spans as follows:

Carmel River, Robles Del Rio	180 ft.
Carmel River, Robinson Canyon	290 ft.
Carmel River, Schulte Road	190 ft.
Paloma Creek, Arroyo Seco Road	40 ft.
Black Rock Dam, Robinson Canyon	60 ft.
Pajaro River at Aromas	451 ft.

The Carmel River Bridge at Robles Del Rio, now complete as shown in one photograph, is located in beautiful Carmel Valley—"the country so gorgeously landscaped by nature." It consists of six 30-ft. spans constructed from 21-in. C B sections connected with 6-in. floor beams on 18-in. centers, and covered with 2½-in. Irving steel grating. These C B sections are cover-plated and formed into a continuous structure by arc welding. A 3-ft. wide precast concrete slab was placed between the two main sections on supports welded to the floor beams. Thus extra width and equestrian walks were provided.

Posts and brackets for the precast safety curbs are formed from surplus 6" x 6" Navy C B pontoon angles as are the steel "Z" pile sections.

The main deck sections were fabri-

(*Continued on page* 104)

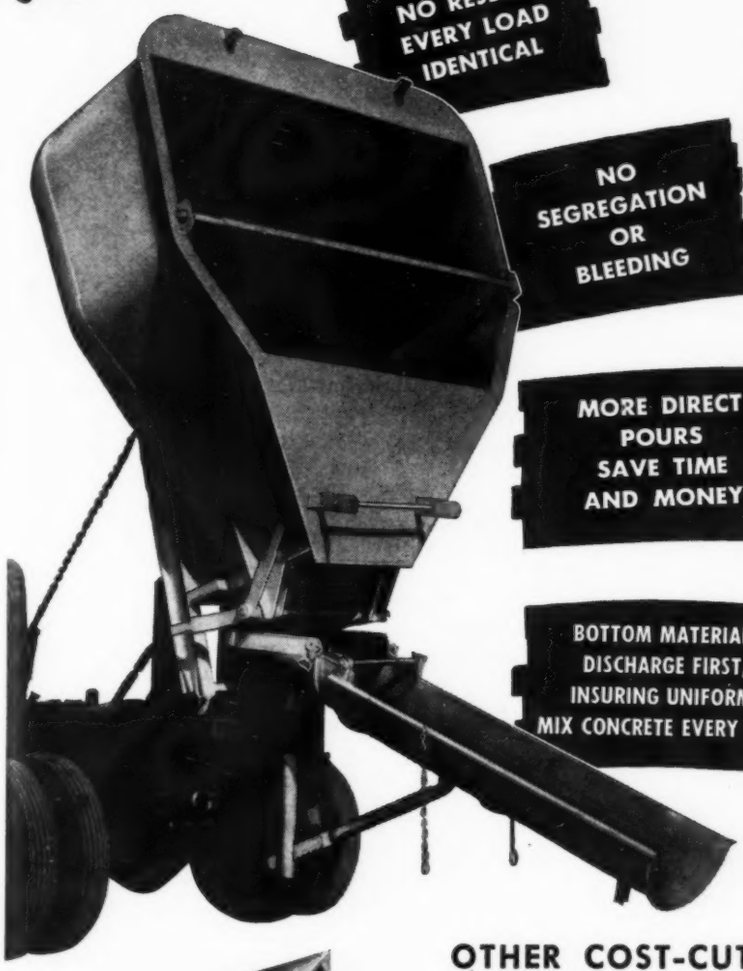
NOW... A Revolutionary New Method of Hauling and Placing AIR-ENTRAINED CONCRETE!

NO REJECTS EVERY LOAD IDENTICAL

NO SEGREGATION OR BLEEDING

MORE DIRECT POURS SAVE TIME AND MONEY

BOTTOM MATERIALS DISCHARGE FIRST, INSURING UNIFORM-MIX CONCRETE EVERY TIME



The Hercules Aircreter

Here's the modern method of delivering and placing air-entrained concrete! With the HERCULES AIRCRETER, every load is identical, rejects are eliminated, because the AIRCRETER delivers premium quality, uniform-mix concrete, exactly as it is produced at the central mixing plant, under absolute control. The lightweight construction of the AIRCRETER also permits more direct pours, cutting time and labor costs on every job.

You'll find more and more of these revolutionary HERCULES AIRCRETERS on the big construction projects, simply because alert contractors can't afford to overlook the benefits—and profits—that the HERCULES AIRCRETER provides. Complete details are available, write today for Bulletin 3-48.

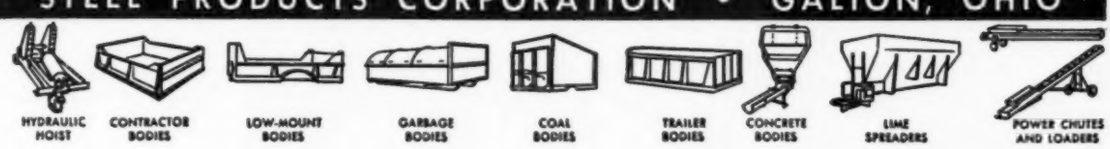
OTHER COST-CUTTING HERCULES EQUIPMENT

Hercules D-12 Contractor's Body, sturdy unit for all-around work. Pyramid-type enclosed steel side braces and full-length rub rails for maximum strength.

Heavy Duty unit, equipped with Hercules Type X Hoist, for installation on straight or drop-frame trailers. Square and round-nosed models.

LIFT WITH EASE— USE Hercules

STEEL PRODUCTS CORPORATION • GALION, OHIO



These Improved Traffic Striping Machines Are

100% Air Operated

Details of two of many specially built machines in an equipment field being eyed by commercial manufacturers

PAVEMENT marking practice has increased to such an extent that use of the most economical and effective methods is worth special consideration today. Standard factory-made machines are coming into wider use. However, special rigs are continuing to reflect local ingenuity.

Two excellent examples of recent traffic striping machines are the machines pictured here, constructed in the headquarters shop of the California highways division and for the city of San Diego, Calif.

Both of these machines are operated entirely by compressed air. Either will paint or positively retrace a single broken stripe, a double white stripe consisting of a broken stripe on the left and solid stripe on the right, or a double solid white stripe and a double white stripe consisting of a broken stripe on right and solid stripe on left. The state highway machine will also place a continuous black line between double stripes when required. Both machines uniformly apply beads on the white stripes.

Data and photos for this article were obtained by the Compressed Air and Gas Institute through courtesy California State Division of Highways, Sacramento, and the City of San Diego.

State Machine Details

The state highway machine employs compressed air to open and close the spray guns, to turn on and off the bead dispensers by means of small air rams, to lift the paint guns and spacer box when approaching obstacles, to lift the front end of the machine by air ram when coupling to a truck for towing and to blow loose scale and residue from pipe lines and hoses after softening with a cleaning agent.

The machine has two nozzles for white lacquer and one for black lacquer, the black being between the two white. The air and lacquer are both carried in pipe lines from the pusher-type truck, which carries the compressor and supplies to manifolds installed close to the spray guns. The levers at the operator's fingertips control a system of three-way air valves. When turned to one position, a solid line is placed. Another turn and a broken line is placed. In addition to the levers controlling the paint, there are two other levers to control spray gun atomizers. Only they are turned off when the machine is not in motion.

Some machines have a bicycle wheel in contact with a drum on the rear axle of the striping machine operating a disc valve to control the cycle of broken line painting, but the California highway division found that temperature changes, variations in weight of operator and other varying conditions changed the radius of the driving wheel, thus requiring frequent adjustments. This difficulty was overcome by using two cam-operated poppet type air valves for admission of air to the spray guns and bead dispenser, there being one of these bead machines directly behind each of the two white paint spray guns. A single adjustable cam permits adjustment to any position for starting a line or picking up an old one. A variable speed drive is used to speed or retard the rate of the cam which operates the poppet type air valves.

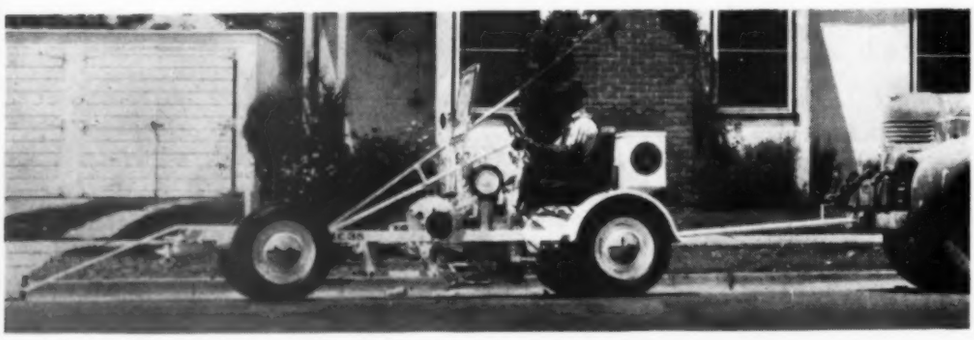
The broken line mechanism is driven from the rear axle of the machine by roller chain and Vee-belts. The ratio of the drive from the rear wheel to the cam is such as to give one turn of the cam shaft to 24 feet of travel. The variable drive overcomes any change in the driving wheel radius.

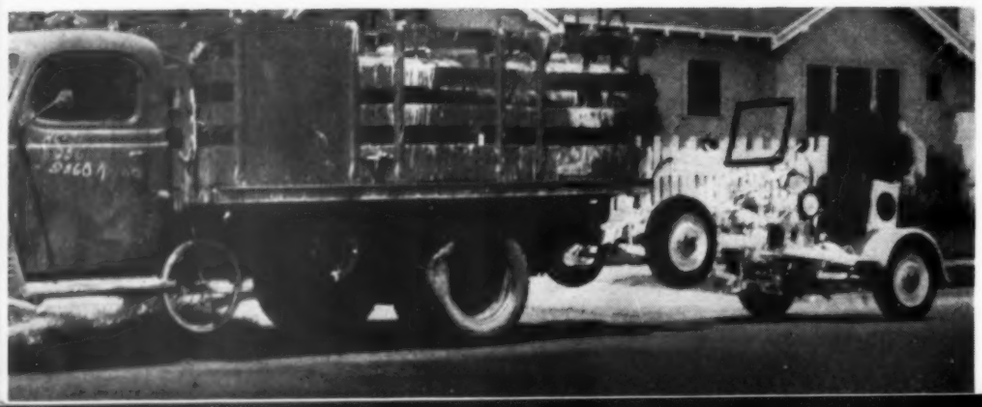
How Transported

When traveling from job to job, the paint striper machine is suspended by a towing ring to the rear of the pusher truck and is moved on its rear wheels only. An air ram is used to raise the front end of the machine, which weighs 650 lb. This ram is hinge-mounted on the front of the striper machine. It has a caster wheel on the lower end to permit side shifting when necessary for coupling.

The paint striper's multiple demands for compressed air are amply supplied by a portable air compressor mounted on the pusher truck. It has a capacity of 53 c.f.m. A small hori-

★ This paint striper machine was devised by the California division of highways for accurately placing traffic markings. The pusher truck carries air compressor and supplies for the striper's operation





★ An air ram on the front of the paint striper serves to hoist it for towing to the job

Compare NEW DODGE "Job-Rated" TRUCKS feature for feature!

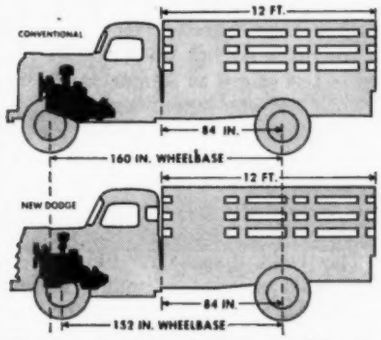
Read this 10 Point Comparison

(Dodge Model F-152; 14,500 pounds Gross Vehicle Weight—and Comparable Competitive Models.)

FEATURES AND ADVANTAGES	DODGE "Job-Rated" TRUCK	TRUCK "A"	TRUCK "B"	TRUCK "C"	TRUCK "D"
Wheelbase	152 in.	181 in.	158 in.	159 in.	161 in.
Cab-to-Axle—to take 12-foot body	84 in.	84 in.	84.06 in.	84 in.	84 in.
Wide-Tread Front Axles (shorter turning—more stability)	62 in.	56 in.	60.03 in.	58⅜ in.	56 in.
Modern "Cross-Type" Steering	Yes	No	No	No	No
Turning Diameter * —Left —Right	50½ ft. 50½ ft.	61½ ft. 61½ ft.	60½ ft. 54½ ft.	54½ ft. 54½ ft.	66½ ft. 66½ ft.
Maximum Horsepower	109	93	100	93	100
Total Spring Length (Front and Rear "Cushioned Ride") †	194 in.	171⅜ in.	162 in.	176 in.	182 in.
Cab Seat Width (Measure of Roominess) ‡	57¼ in.	52¼ in.	51½ in.	47½ in.	52¼ in.
Windshield Glass Area ▲	901 sq. in.	713 sq. in.	638 sq. in.	545 sq. in.	713 sq. in.
Vent Wings plus Rear Quarter Windows	Yes	No	No	No	No

* To outside of tire (curb clearance.) Computed from data based on tests or computations obtained from usually reliable sources. † All four springs. ‡ Measured from production models. ▲ Computed from width and depth measurements; no allowance for contours.

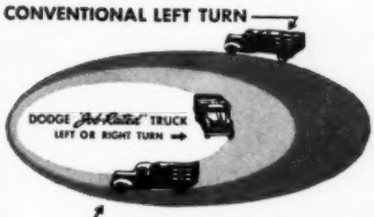
Better Weight Distribution Easier Handling Shorter Turning Diameters



Front axles have been moved back, engines forward, placing more load on the front axle. While cab-to-axle dimensions are the same, wheelbases are shorter, giving better weight distribution, and increased payload.

This new weight distribution, combined with longer springs, produces a marvelous new "cushioned-ride."

You get still more comfort from new "Air-O-Ride" seats, with their easily controllable "cushion of air."



You can turn in much smaller circles, both right and left—you can back up to loading platforms or maneuver in crowded areas with greater ease—because of new type "cross-steering," shorter wheelbases, and wide tread front axles. In all, 248 different "*Job-Rated*" chassis and body models. Up to 23,000 lbs. G.V.W. Up to 40,000 lbs. G.T.W.

1—PLENTY OF HEADROOM.

2—STEERING WHEEL . . . right in the driver's lap.

3—NATURAL BACK SUPPORT . . . adjustable for maximum comfort.

4—PROPER LEG SUPPORT . . . under the knee where you need it.

5—CHAIR-HEIGHT SEATS . . . just like you have at home.

6—7-INCH SEAT ADJUSTMENT . . . with safe, convenient hand control.

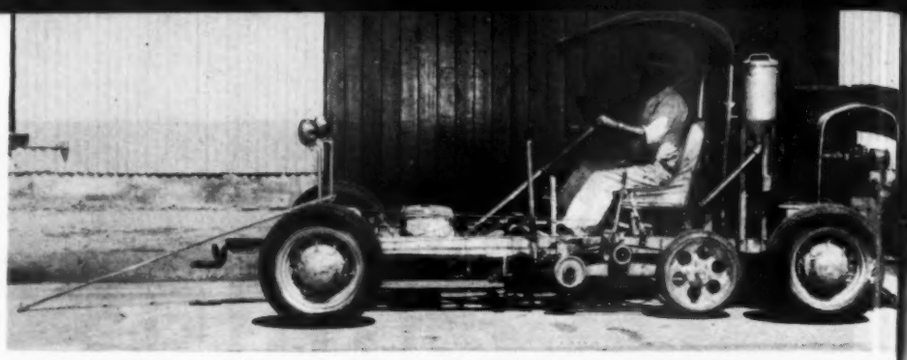
7—"AIR-O-RIDE" CUSHIONS . . . adjustable to weight of driver and road conditions.

zontal receiver is located on the floor of the truck. A pressure of 100 p.s.i. is used at the receiver and reducing valves are placed in the line to each paint container. Ordinarily a pressure of 60 p.s.i. is used to force paint from the containers through pipe and hoses to the machine, but this pressure may vary according to temperature and viscosity of the paint.

Air pressure for spraying, varying between 40 and 50 p.s.i., comes directly to the machine from the receiver, the pressure being controlled by the operator.

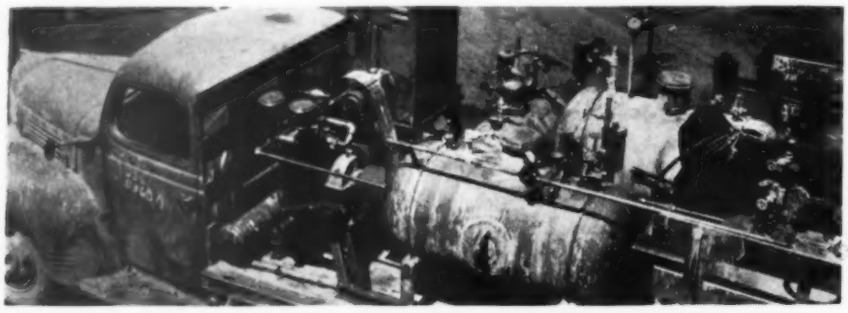
The bead dispensers tie into the controlled method of paint striping simply by having the air cylinder for each dispenser operated from the same source of air which operates the paint spray. When the paint spray is turned on, the ram releases the beads and then closes when the paint spray is shut off. The bead storage compartment is located over a cone which is welded to a shaft connected to the air cylinder which operates the opening and closing ram. Small fins on the surface of the cone insure uniform distribution.

This machine, which places simmultaneously any combination of marking called for in standards of the Joint Committee on Uniform Traffic Control Devices, is a long call from the machine California was using 15 years ago. That improvisation consisted of a can of paint attached to the end of a pole, with a wheel under the can. A later machine consisted of a paint brush dragged between two plates. Gradually improvements were made by the application of compressed air to one step and then another until the entire operation was powered by compressed air. The evolution of the modern machine today came about under the direction of superintendent Burnside.



★ Another modern traffic marking—for San Diego—carries an air compressor and supplies independently of the pusher truck. The "fifth wheel" controls spacing of broken line painting

★ California highways pusher truck carrying air compressor, receiver tank, paint and other supplies for traffic striping



★ San Diego paint striper foot pedal for driver's right foot, manifold with air valves within driver's arm reach for control of air lines and the adjustable cam for setting broken line spacing below, left of steering wheel. A closer examination of the lower parts will show location of spray guns and bead hopper directly behind

San Diego Machine

Cities and towns which would not have sufficient paint striping work to assign a full time pusher truck, will find a solution in the paint striper devised by John Seuss, superintendent of shops, city of San Diego. This unit is completely self-contained with air compressor and supplies so that any truck may be used at any time for the pushing.

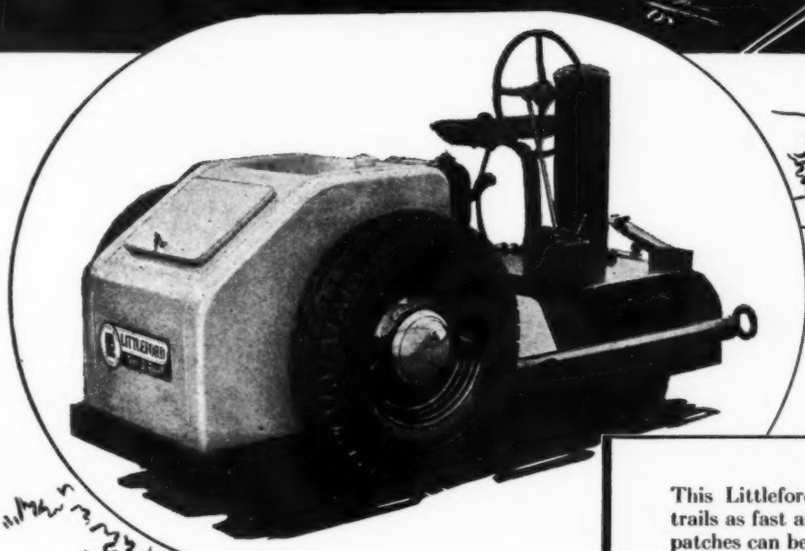
The paint striper used by San Diego has a single-stage air compressor of 24 c.f.m. capacity. This source of power supplies to the 30-gal. paint pot the pressure to pump the paint out through a Y-connection to the two-paint spray guns, either of which may be set for a single 4-in. line or both together for 3-inch lines. Adjustable guide slides are used for any desired spacing and for the assurance of a clean line.

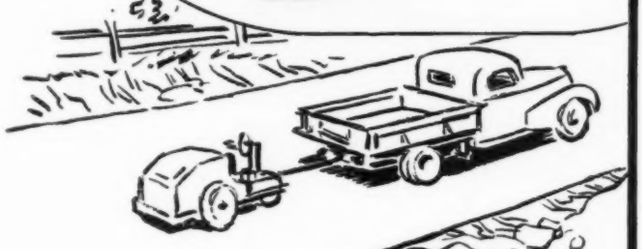
The air lines leading directly from the receiver tank to the spray guns are controlled by a foot pedal convenient to the driver. This pedal may be locked for long stripes. A marking guide extends in front of the machine to assist the driver in following old lines or in following the surveyor's marks for new lines.

The method of accurately retracing broken lines differs from that used by the California state highway division machine. The city's broken lines are set for 9 ft. of paint and 15 ft. of unpainted space by means of an adjustable cam, which is set at the start of the striping job. This spacing is controlled by a hard rubber-tired wheel which is lowered to the pavement and which is independent of the pneumatic-tired wheels of the paint-striping machine. Varying temperatures or weights of drivers do

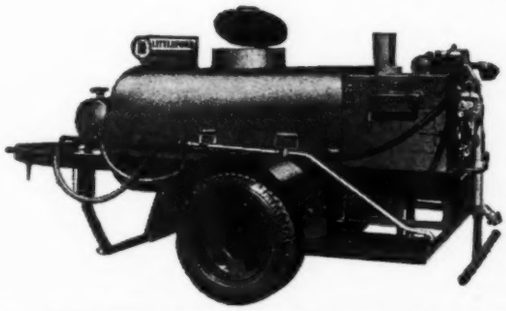
(*Continued on page* 111)

PATCH THOSE HOLES
INSURE AGAINST RAVELING
ROLL THEM WITH A LITTLEFORD
Model 155 TRAIL-O-ROLLER

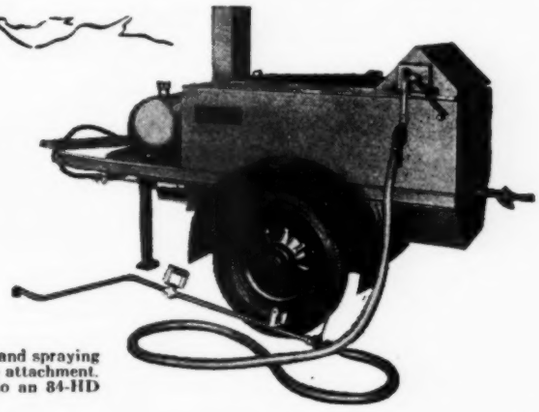




This Littleford Trail-O-Roller really gets around. It trails as fast as a maintenance truck can go. Dozens of patches can be rolled in a single day. With roads, highways and streets in such a deplorable condition, each patch should be made permanent, should be rolled with a Trail-O-Roller. Rolling a patch saves time and money —the patch is in to stay—it does not come out. The portability of the Trail-O-Roller and the patented Hydraulic Raising and Lowering Device makes it easy to roll every patch and the time it takes to roll it adds practically nothing to the cost. When patching your winter wrecked roads, roll them with a Trail-O-Roller, make it a permanent job. Write for Bulletin No. 3.



For small application, patch or crack filling jobs, apply your bituminous material with a Littleford No. 101 Utility Spray Tank, it's the most versatile unit made today. Has 10 ft. circulating spray bar, hand spray attachment and pouring pot outlet. Write for Bulletin No. 5.



Those pot holes can easily be patched by applying stone and spraying asphalt with a Littleford 84-HD Kettle with a hand spray attachment. For fast heating, efficient operation, there's no equal to an 84-HD Kettle. Write for Bulletin No. 1.

BLACK TOP ROAD MAINTENANCE EQUIPMENT · LB · SINCE · 1900

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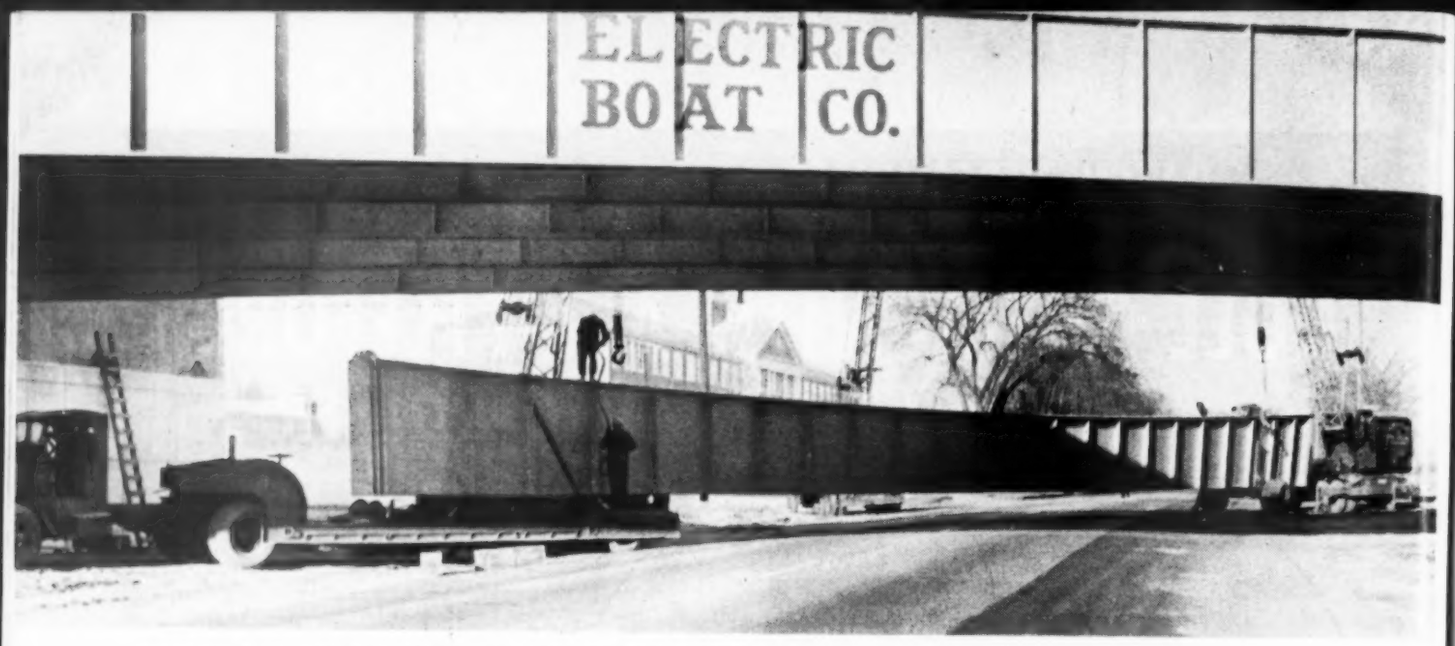

Another Long Girder—Shown on this page is the ticklish business of moving a 127-ft. 22 ton girder into position. No novel methods were used, the hauling job being performed with a low-bed trailer and rear dolly, and the lifting performed by two truck-cranes with a third crane shown standing by to assist. The project is an "overhead" on the Wilbur Cross Parkway; the contractor is Mariani Construction Co. of New Haven, Conn.

Trailer-fuls

Hauling Guard Rail Posts—Six 15-ton semi-trailer units are among the new equipment recently acquired by the Connecticut State highway department. The department used these trailers for many purposes, one of which is depicted here. Guard rail posts are hauled, 350 at a load, whereas the 6½-ton dump trucks formerly used could haul only about 90 posts. The trailer, being low, saves effort and time in loading by men on the ground. Whereas posts had to be chained down on the trucks, the workers just heave posts in place on the trailers, and posts lying in transverse position can likewise be unloaded merely by sliding them off at the right moment as the trailer travels along.

Two Up? Why Not—Not seen every day is the practice of doubling up and carrying two full grown tractors on a single trailer trip. Not a bad idea. This scene snapped in Iowa

World's Largest Dragline Bucket—It took six axles to carry this 30-cu. yd. bucket, recently completed by Page Engineering Co. for The Northern Illinois Coal Corporation. To be operated by a Marion dragline, this cute little bucket will make fast work of stripping

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1½-in.—THE FLASH—(3M) Rating 3,000 G.P.H.
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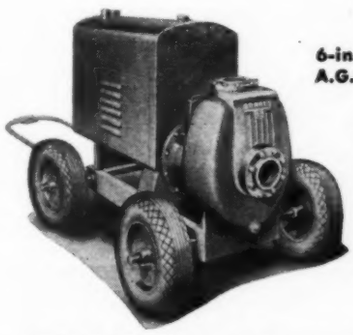

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★ Two machines begin hoisting first of the heavy cantilever girders

Cantilever bridge to serve Michigan summer playground country. An example of modern design combining functional efficiency, tasteful appearance, structural simplicity and ease of erection

Quick Work With Two Cranes

By C. H. Voss,
Bridge Office Engineer, and

C. W. Kime,
Project Engineer, Michigan State Highway Department

TOURISTS traveling north through Grand Rapids into the Traverse Bay region this summer can utilize an important new road link. One of the last gaps in M-37 is filled by the completion of a 3-span cantilver deck girder bridge and approaches, crossing the Pine River in Wexford County. Located in one of Michigan's most picturesque settings in the heart of Manistee National Forest, the bridge supplants a county road bridge posted with a 5,000-lb. load limit. The new structure, located 150 yd. from this old twice rebuilt caisson-supported truss dating from 1900, affords a dramatic demonstration of the advance made in highway bridge design. These hollow caissons of the old bridge were filled with sand and held in place with cables anchored to dead men buried in the ground. This structure was probably considered a first class bridge when it was built, but under present day conditions the structure is entirely inadequate and obsolete and could not be considered for use in the relocation of this important highway.

The Michigan state highway department, Charles M. Ziegler, state highway Commissioner, designed and built the new bridge as a Federal-aid project. The department's bridge division under George M. Foster, bridge engineer, designed the structure and supervised its construction.

The original general contract called for a lim-

★ First cantilever span in place, resting on bearing and splice bolts being set while cranes are unhooked

ited amount of approach work, but in order to complete the surfacing of the remaining sections of this highway, the contract was extended to cover considerable grading and surfacing, so that with the completion of the bridge, the highway may be opened to traffic from Peacock, Mich., north to highway M-55.

If a person were to compare the original structure crossing the Pine River on the old county road and the new structure which is to replace it, he might feel that the new structure was extravagant and unnecessarily large. In order to cross the Pine River Valley, and to maintain grades in line with present construction limitations, the bridge was built to a considerable height above the river.

The approach roadway grade is on a minus 3.19% to the south and plus 5.8% on the north. The structure itself is located on a compound vertical curve. Another factor which affects height is the backwater level of a power dam contemplated below the bridge.

H-Piles for Stability

The abutments for the new bridge are reinforced concrete of standard stub gravity section and are established on steel H-piling in the roadway fill. The height of the abutments from the bottom of footing to crown of roadway is 16 ft. The steel H-piling are considered necessary to support this substructure unit on a relatively high approach fill, which could not be consolidated to a degree where it was practical to place a concrete abutment on the fill without the use of piling.

The piers were designed for economy and architectural beauty, and are of the column-and-girder type. The piers are designed to appear solid when the dam back-water reaches its proposed level. They are also designed to resist ice pressure.

Pier columns are 5 x 5 ft. at the top and 6 x 6½ ft. at the bottom. The top beam is 6 ft. deep x 43 in. wide; the lower beam, 4 ft. x 52 in. The footings were designed for 6300 psi. maximum and 4500 per sq. ft. average pressure. Pier height from bottom of seal to girder bearing is 56 ft.

Suspended Center Span

The superstructure consists of 3 spans of steel deck girder design, of which the two 101'-4½" end spans act as simple spans, with cantilever arms extending out from the piers to support a suspended span. The center span is 122'-3". The sidewalk supports cantilever out from main girders. The bridge was designed for H20-S-16 loading.

The structural steel for the superstructure consists of two lines of curved bottom-flange built-up girders, spaced 30 ft. center to center. The intermediate system consists of 36-in. wide-flange standard floor beams and 18-in. wide-flange, 55-lb. stringers. Floor beams are spaced 20 ft. and stringers 5 ft. c. to c. The structural steel is fixed at the piers, with expansion at the abutments and at the center suspended span.

The main girders are 72½ in. deep at the abutments, 150½ in. over the piers and 66½ in. at the suspended span. The suspended span is 66½ in. deep. This span is joined to the cantilever ends of the anchor arm spans by two 6-in. pins in each girder, and two 1⅛" x 11" suspender bars.

Winter Pier Construction

Construction work on the general contract was started December 3, 1946, and completed in November, 1947, except for field painting of structural steel and railing, and installation of railing.

The first work was the construction of the river piers. The soil in this vicinity is a fine sand which has good bearing qualities if confined. In order to confine the soil, a steel sheet piling cofferdam of the interlocking type was driven around the pier footing outline to a depth of 10 ft. below the bottom of the sub-footing. The bottom elevation of the sub-footing was 8 ft. below stream bed. The sand was excavated from the cofferdam after which it was dewatered and the concrete placed in the dry. The steel sheet piling was left in place to protect the footings of the piers from stream erosion.

The substructure of both piers was placed during the winter, necessitating the building of a steam heated house around each unit. A room temperature between 50° and 70° F. was maintained during weather that sometimes dropped to 20° below zero. Free steam was allowed to escape during the heating period, assuring proper curing of the concrete.

The stub abutments were cast in the late spring of 1947 after the fill was made and allowed to settle during the winter. Abutments rest on 65-ft. steel H-piling driven to 40-ton bearing. The piling were driven through the roadway fill, penetrating the natural ground 10 ft. or more and extending into the reinforced concrete footing a distance of 2 ft.

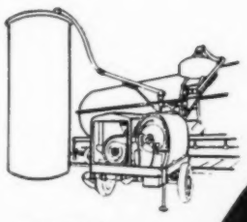
Two Cranes and Flat-bed Handle Steel

Structural steel was delivered in July of 1947 at Wellston, Michigan, nine miles from the site. Among the steel members were four girders weighing 28 tons and four weighing 32 tons. As the roads in the vicinity were not designed to carry 32-ton loads, the contractor used a heavy carry-all trailer, transferring girders from rail cars with a 50-ton Link Belt crane equipped with 80-ft. boom and 20-ft. jib. The carry-all was brought to the site with an RD8 Caterpillar bulldozer.

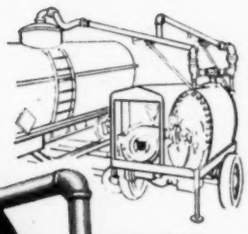
The bridge superstructure is composed principally of 4 anchor girders, 4 cantilever girders and 2 suspended girders, and the erection of these units presented the contractor with

★ Setting second line of girders. Note erection tower and relationship of end span to cantilever

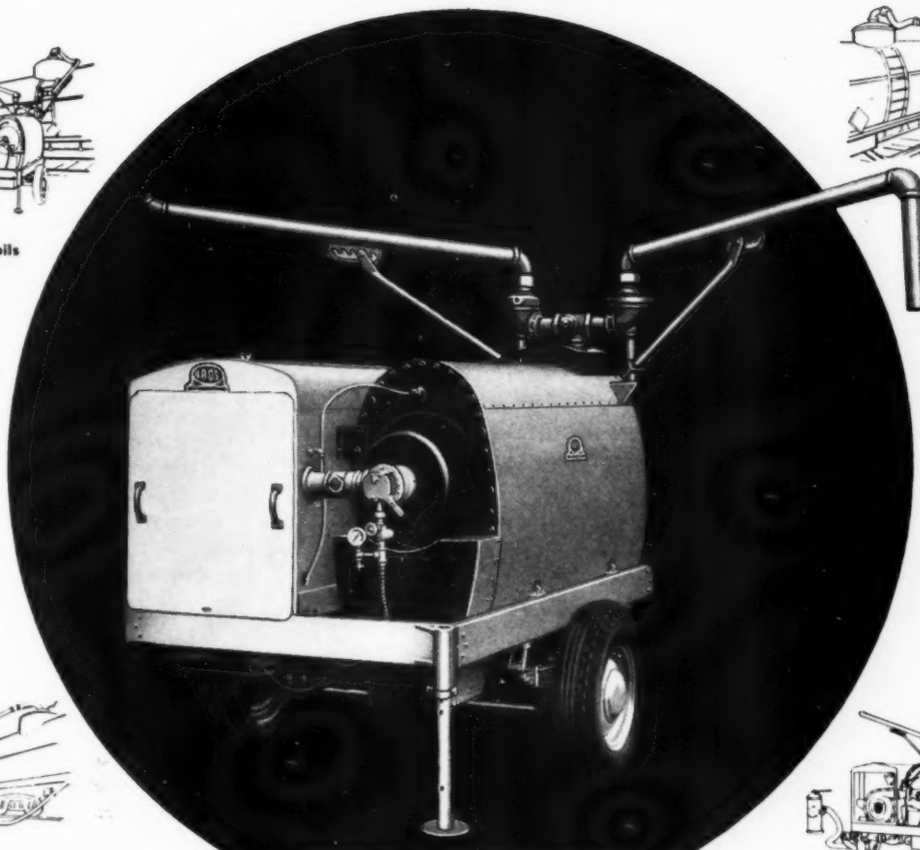
BETTER HEATING BEYOND THE RANGE OF STEAM

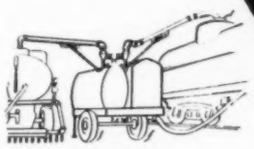


Heating and pumping heavy oils from tank car to storage tank

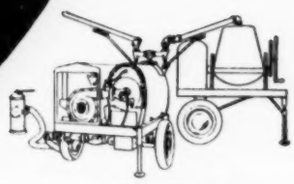


Heating and circulating oil through tank car for unloading.





Heating and pumping oils from tank car to distributor



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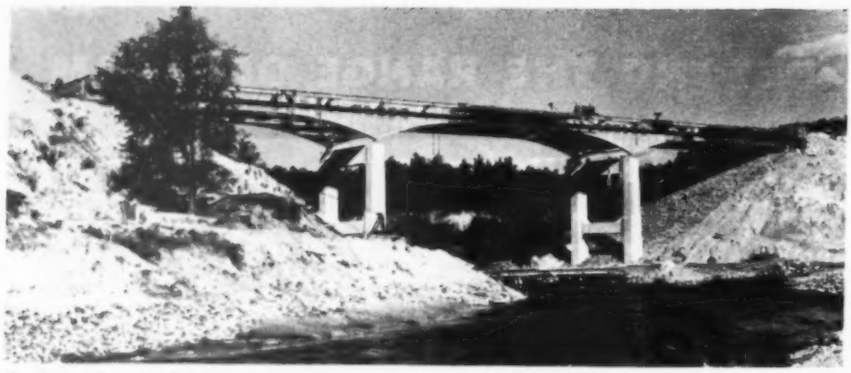

★ General view of structure nearing completion, showing high level which anticipates impounding of stream

his greatest problem.

Two steel erection towers were erected on driven wood piling, placed in a position to support one end of the anchor girder. This was approximately half way between the piers and the abutments. The anchor girders were unloaded at the high level while the cantilever girders were unloaded at the river level. One 50-ton crane was kept at the high level, while another 50-ton crane was stationed below. Each crane took hold of an end and set the anchor girders in place, one end over the bearing of the abutment and the other resting on the steel towers.

After anchor girders were in place, both cranes were placed at the river level. Here both cranes hooked onto the cantilever girder and held it in place over the pier, while the field splice was being made between the anchor and cantilever girders. The same procedure was followed on both sides of the river.

The suspended girders were much lighter, weighing only 8½ tons, requiring only one crane to set these members in place. The two 6-in. connecting pins and suspender bars were then placed to form the connection between the cantilever girders and the suspended span girder. No difficulty was encountered in the field erection of this steel.

Following the erection of the main girders, the floor beams and stringers were placed, after which the forms were placed for the concrete slab.

Refinements

The deck slab is of r.c. concrete of 7-in. minimum thickness. The structural steel members are so arranged that the 7-in. slab thickness follows the roadway crown, thereby lightening the dead load and producing a more economical design. Forms for the superstructure slab were supported by the usual type wire hangers, hung over the floor beams which held the studs. On the studs was placed shiplap flooring, forming the under side of the concrete deck. Following casting of the deck, the wire ties were cut and forms for the under side of the deck removed.

Pilasters with stepped-up wingwalls are provided in each quadrant to maintain the backfill in its proper position and presents a balanced appearance. Three-foot sidewalks with steel railing are provided on each side.

Quantities

The major quantities of work on the above bridge are as follows:

Structure

Foundation excavation	1,140	c.y.
Steel piles driven	2,923	l.ft.
Steel sheet piling left in place	3,650	sq.ft.
Grade A concrete substructure	1,007	c.y.
Grade A concrete superstructure	417	c.y.
Steel reinforcement	166,324	lb.
Structural steel	796,990	lb.
Bridge railing	644.7	l.ft.
Channel excavation	11,057	c.y.
Plain riprap	655	c.y.
Heavy riprap	400	c.y.
Heating and housing substructure concrete	533.6	c.y.

Approaches

Earth excavation	85,620	c.y.
Overhaul	23,644	comp. c.y.miles
24" corrugated metal pipe	671	l.ft.
24" Sewer	150	l.ft.
18" Sewer	1,418	l.ft.
15" Sewer	800	l.ft.
12" Sewer	1,290	l.ft.
6" Sewer with open joints	1,260	l.ft.
Stabilized aggregate surface	5,185	tons
Clay surface	1,610	c.y.
2 Cable guard rails	4,280	l.ft.

The total cost of the bridge contract, including the added approach work, is approximately $319,510, including structural steel contract of $70,725.

When the final section of M-37 is completed from M-55 North to Mesick, a direct north-south route from Grand Rapids to Traverse City will be available to tourists entering this vacation playground. The section of M-37 now complete from Peacock to M-55 will open up thousands of acres of natural forest reserve to tourists and sportsmen and will provide a route which will carry modern high speed traffic quickly and easily to a country which was accessible only by backwoods trails and secondary county roads.

Acknowledgments

Structural steel, furnishing and fabrication, Bethlehem Steel Company; general contract, Walter Toebe & Company, Lansing, Mich.; subcontractor, Claude Loomis, Grand Rapids; engineer of bridge construction, E. H. Haahr; district bridge engineer, H. J. Conroy; project engineer, C. W. Kime.

Truckers Urged to Promote Traffic Relief Measures

Asserting that local traffic conditions are rapidly reaching the point where it will be physically impossible for all vehicles wishing to enter business districts to do so, Harold F. Hammond, Secretary of the Urban Transportation Committee of the Chamber of Commerce of the United States, called upon truck operators to work closely with public officials toward finding and applying remedial measures.

Trucking groups, he told the Local Cartage National Conference recently at New Orleans, should become active in local traffic and safety groups and, when conditions warrant, should form special committees.

Highway and street officials and engineers will be interested in the fact that truckers were urged to promote the following:

1. Encourage local officials to give more consideration to truck problems when local parking and traffic surveys are conducted.

2. Encourage the development of off-street parking facilities for passenger cars, as well as the development of off-street loading facilities, so that the curb parking of passenger cars can be further restricted without justified complaints from motorists.

3. Encourage architects and engineers to design adequate off-street loading facilities in new commercial and industrial structures.

4. Encourage the use of one-way streets in business districts. One-way streets often handle 50% more traffic per rush hour than two-way streets.

5. Urge the designation of specially marked routes for through truck movements.

6. Aid in the establishment of depots outside of congested areas where over-the-road truck loads can be transferred to smaller trucks. A good example of this is a trucking terminal just outside Boston having an island platform that will accommodate 21 road trailers and 18 pick-up and delivery trucks at one time.

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Photo above shows a typical soil-cement street, 33rd Street between 12th Avenue and Hamilton Road, Columbus, Ga., paved in 1944.

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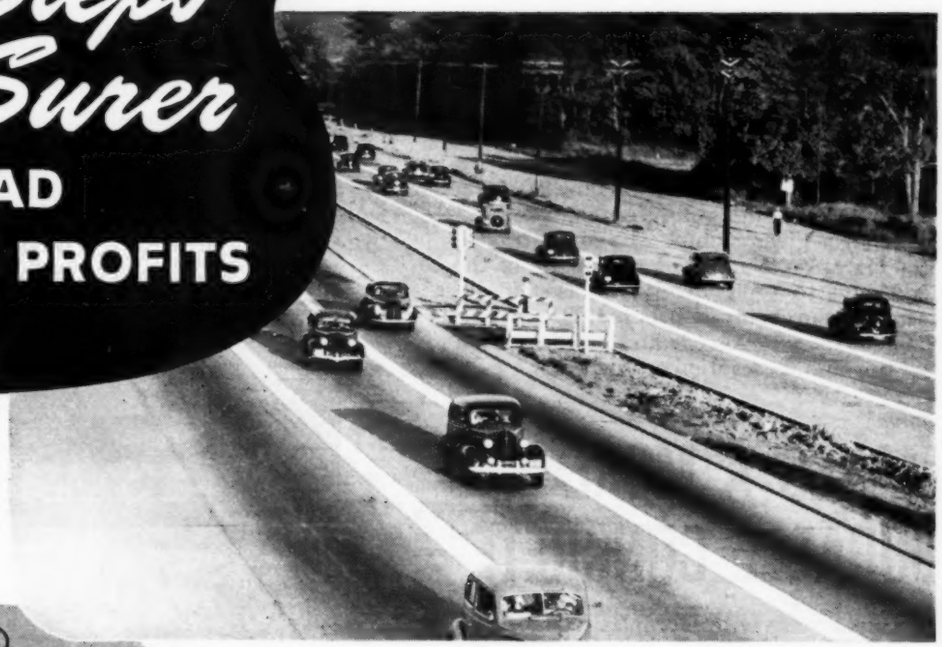

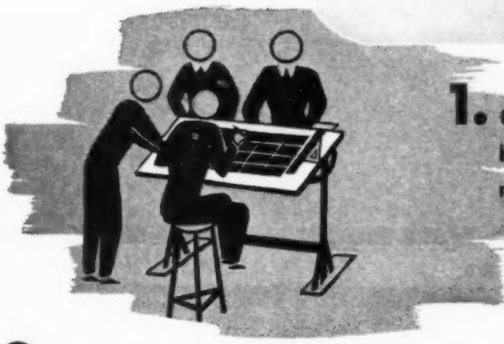

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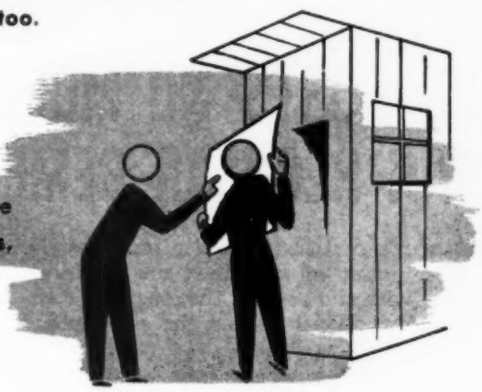

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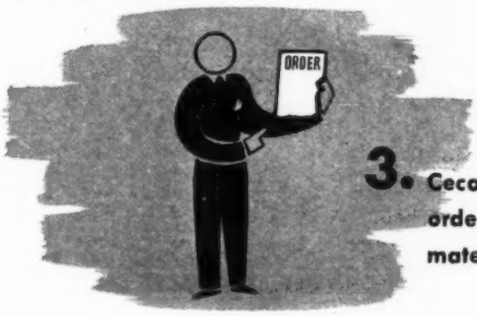

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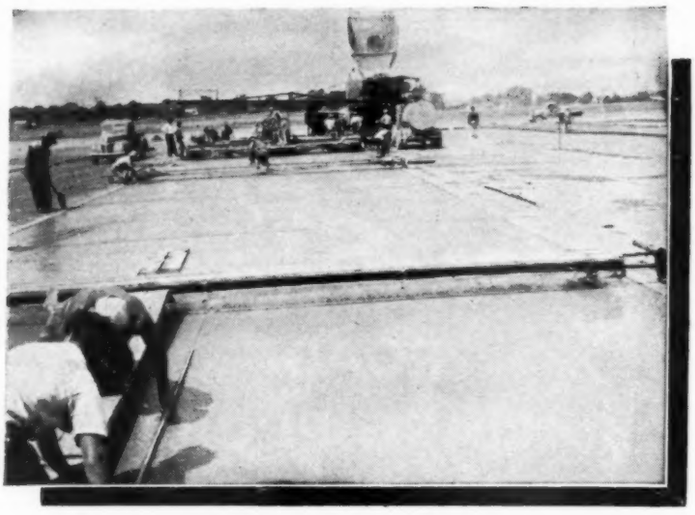

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Welding Cables Running Hot?

Causes and Cures for Hot-Running Welding Cables and Connections

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MANY users of the arc welding process do not appreciate the basic fundamentals of its operation. The welding arc is the result of a manually or otherwise controlled variable inefficiency in a high amperage, low voltage electrical circuit. When an inefficiency occurs anywhere in the circuit, except at the deposition end of the welding electrode, it creates heat and loss of energy where it is not desired.

Welding Cables are nothing more than pipelines carrying welding current from the welding machine which acts as a pumping station.. The operator regulates the controls for required volume and pressure or amperage and voltage as electrically termed. An efficient, cool-running welding circuit is provided with ample size cables tightly connected throughout. It takes *only one* bad connection on either the ground or electrode cable to make the whole circuit hot-running and inefficient.

Where Inefficient?

A welding machine that, in operator language, is "*running hot*" or has "*turned cold*" usually indicates an inefficiency somewhere in the cable circuit rather than the fault of the machine. Of course, loose connections in the machine or overload usage can cause winding, insulation, armature or stud burnout. Check the cables and connections before assuming that the machine is the cause of the trouble.

When electrode holders, ground clamps, connectors, lugs or splicers run hot they ordinarily do so as a result of their being loosely attached to cables; or the cable may have broken strands that are not visually detected which reduce its carrying capacity. Use of undersize equipment, corrosion and wear can also be contributing factors. Before condemning the machine, cable or its connections, check the following points:

1. Quick visual inspection of the entire welding circuit for cable breaks or "shorts" should be made.
2. Lugs or terminals bolted to machine studs should be checked for tightness and possible corrosion of contact points. These are often concealed under covers or on the backs of control panels where difficult inspection makes for seldom checking.

Eliminate the use of wing nuts wherever possible. It takes a wrench to tighten a square or hexagon nut, but tightness is assured. Finger tightened wing nuts loosen easily from cable tugging by the operator.

Electrode Causes

If the trouble is centered around a **Heating Electrode Holder** there is a good chance one of the following causes will be found:

1. Loose mechanical connection or attachment of cable to holder. All mechanical connections should be further tightened after the holder has been in use for a short period of time.
2. Use of too small a cable for the amperage required. Use of light whip cables is the worst abuse. For top efficiency the shortest practical length of cable for the work required should be used.
3. Insufficient jaw pressure due to holder design; anneal weakened spring or springing of holder causing a loose spring that does not correctly power the jaws.
4. Dirty or corroded jaw contacts. An occasional light touch-up with a three cornered file eliminates this trouble.
5. Use of too small a holder or excess amperage beyond the holder's rated capacity.
6. Use of holders with the insulation worn or burned off, permitting

"Welding Problems"

greater "soak-up" of reflected heat from hot jobs than holders with good insulation intact. Some insulations actually hold absorbed heat in the holder.

7. Insufficient current transfer to upper jaw of tong type holders due to shunt or pin corrosion or breakdown.

Ground Causes

If the trouble is with a **Heating Ground** look for these things in your welding cable circuit:

1. Loose or broken cable attachment is the most common abuse. Dirty contacts on the clamp, ground or work is second.

2. Placement of the ground at a point distant to the arc such as a "common ground" used in many large shops in very inefficient. Forcing current to travel through a moving contact is done at great loss and sacrifice of a stable arc in most cases.

3. Spring or pressure clamps placed on thin sections do not provide maximum jaw pressure needed for high current work. Place the clamp on a thick section as near the arc as possible.

4. Steel grounds lightly tack-welded for easy removal cannot carry high amperage equal to a heavy copper cable conductor.

5. Ground clamps of the spring or screw type installed on rusty, greasy or corroded surfaces dam up much current. Provide clean contact surfaces.

6. Spring or jaw type ground clamps with cable attached to one jaw but not shunted to the other jaw can heat when the unshunted jaw is forced to carry current.

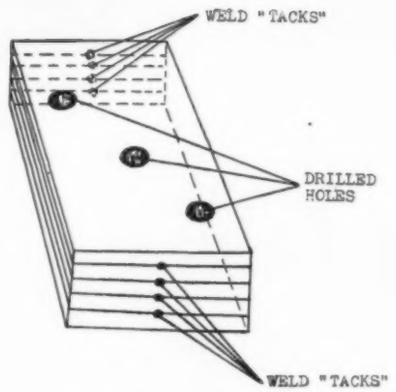
7. Use of a low conductivity material for the ground with insufficient contact area for current transfer.

How to Spot Weld to Prevent Slip

By W. F. Schaphorst
M.E., Newark, N. J.

Now that so many mechanics are equipped with welding outfits of one kind or another, here is an excellent kink for use when it is desired to hold pieces of metal together immovably. For example, should you want to drill identical sets of holes through two or more pieces of metal with the utmost accuracy, use this method.

As shown in the sketch, place the pieces to be drilled on top of each other and then "tack" them together as indicated, on opposite sides. There will then be no slipping or moving of the pieces with relation to one another as is too often the case where they are held together in the old-fashioned manner. Clamps don't always hold together as every reader knows, and, further, the work is harder to handle when encumbered with clamps.



(*Continued from page* 58)

Earth Moving Evolution

R. M. Gillis, assistant state highway engineer, California, summed up the amazing evolution of earth moving equipment. Noting that contractors used to worry about their "horses eating their heads off," Gillis pointed to the huge capital outlays and high interest charges for today's outfits. Contractors need to be assured of a steady succession of work, and there's a responsibility for the engineer here. In California, further noted Willis, 224 road jobs were under contract or advertised as of early April, and the state expects to let nearly $2,000,000 per week indefinitely into the future.

A sobering note was injected into the discussion of the apparent trend toward heavier earth moving units. T. H. Dennis, California state maintenance engineer, said that the damage of heavy equipment in passing or being hauled over existing roads is terrific. A west-coast machinery distributor representative said that his sales reflect a somewhat downward trend in scraper sizes. Fewer 25-30 yd. scrapers are sold today, as compared with 1938 and 1939, the bulk being 16-18 yd. units which require only occasional use of push tractors. Mobility, and avoidance of use of special trailers for over-the-road transport, are also of increasing interest to contractors along with pay loads.

What Roller Type?

Use of smooth rollers should not be overlooked, said a speaker from New York. They are specially useful in wet climates, for ironing out the fills as work progresses so as to shed water. New York's range of roller weights is from 8 to 15 tons, the lighter units being used in sandier soils. Tow-type smooth rollers are sometimes useful; an example of their use on a large dam project was noted by Wilbur of Morrison-Knudsen.

Sheepsfoot rollers discussion centered chiefly on the need for standardization on fewer designs. (An editorial in this issue of ROADS AND STREETS covers this phase of the meeting).

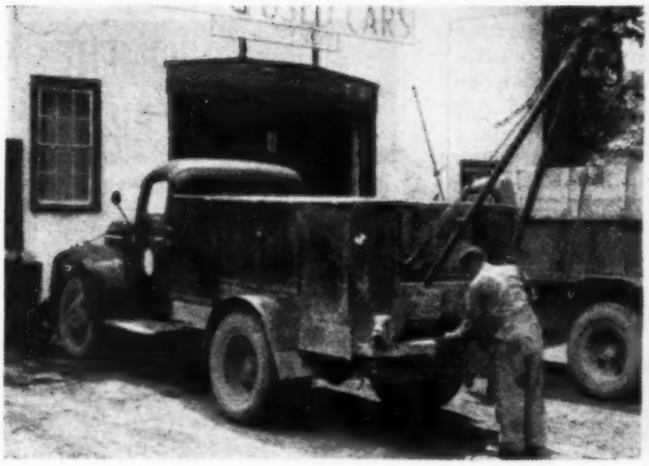
Vibratory equipment developments have progressed to the point where contractors can expect to buy production-line equipment in the not too distant future. A 3-wheel tandem smooth roller with vibratory unit was discussed. A representative of Iowa Manufacturing Co. described a new unit (Cedarapids Compactor) which will bring the soil to required density in a single pass. Rubber tires with widely variable pressures are involved. Experimental work is continuing on this machine, which is being introduced this summer.

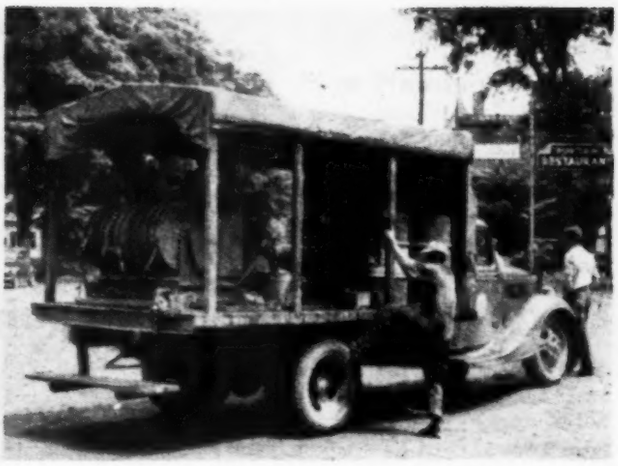
Crushers Need Better Sampling Control

Portable crushing and screening plants have played an increasing role in the economics of getting a compact and stable roadbed. In discussing this equipment E. B. Bail of New Mexico said that contractors in his state have a heavy investment in modern mobile units. A common problem there is that of getting fairly uniform materials to the crusher. Layered pit material is mixed satisfactorily when loaded by a skillful shovel operator, but contractors' preference to work sandy pits with elevating graders has led to trouble. Constant testing and watching of fines are necessary. Mr. Bail said that his state particularly needs a device on the crushing plant that will sample all the time, making it possible to take say 10 small samples in 5 minutes. Such a sampler would serve to help get a more uniform roadbed.

The subject of stabilization plant equipment, stationary and traveling, centered largely on refinements in equipment. Increased power and better design of tines and other parts has improved the ability of much equipment to pulverize as well as mix. Hardfacing of tines was frankly recommended by one manufacturer representative, where the user has exceptionally tough clodded or rocky soil.

(Further notes on the ARBA conference at San Francisco, covering a critical discussion of concrete and bituminous paving equipment, will be published in next month's Roads and Streets).





More Service Rigs

(See photos above)

Arute Bros. on their 2½-million-dollar US 20 relocation job in upstate New York, last year, had equipment stretched out over twelve miles of grade. And we do mean stretched, as this outfit had bad weather for sure, and had to "move machines up and down the job all the time looking for places dry enough to work," as a local farmer aptly expressed it. 1,300,000 cu. yd. unclassified (10% rock). Maybe fifty pieces of equipment.

To service and repair their trucks the contractors set up shop in a small-town garage along the job and for heavy equipment and field spot repairs worked out with two "traveling garages" and two large grease-air trucks. The "garages" consisted of light dual-tired trucks with special enclosed metal bins (weatherproof and locked) for parts and tools—one for tractors and one for general service. Each truck had a small rear pick-up boom for use with a hand-operated chain hoist, and a vise built onto a rear corner (see photo).

The grease trucks were Ford 1½-tonners, each with four Alemite grease lines and an air line for tires. Typical rigs, except for an elegant "refinement" or two, such as the convenient rear step. Roofed over, which is always a good idea; easy to drop canvas down in really bad weather.

California's War Surplus Bridges

(*Continued from page* 92)

cated originally for LST's, the Navy's floating drydocks, which though used for ship repair, were primarily used for lifting loaded landing craft from staging for forward and assault areas. The above noted bridges required 250 tons of LST deck sections, and the county has purchased an equal amount for future construction.

Sacramento County has just completed a bridge across the Cosumnes River at Michigan Bar consisting of two 138-ft. spans of Bailey truss war surplus material.

These Improved Traffic Striping Machines Are 100% Air Operated

(*Continued from page* 96)

not affect the radius of the wheel and any slight wear can be corrected for its effect on spacing by means of an adjustable pulley.

This automatic spacing control for broken lines operates either or both paint spray guns according to the setting of the valve. The bead dispenser is controlled from the same source. A pot for glass beads fills the bead hopper by gravity. The hopper is located directly behind the spray guns. When air opens or closes the spray guns it simultaneously opens of closes the bead hopper.

*** Cameron Joyce & Co. of Keokuk, Ia., contractors on a grading job US 67, Missouri, use this truck for just about everything. It carries a light plant, gasoline supply tank, tool box, hand greasing outfit, and oil barrels. The front-end boom operates with a chain fall**

New Construction Equipment and Materials

1

New FWD Maintainer

The new 1948 FWD maintainer, latest in the standardized line of FWD trucks, has been announced this month by the Four Wheel Drive Auto Co., Clintonville, Wis. The maintainer is the 1948 version of a model developed by the company especially for maintenance of dirt and gravel roads. The maintainer is a standard model in the company's "H" series, and is designated the HG. It has a gross rating of 20,000 lb. and a chassis weight of 8,000 lb. Standard wheelbase is 154 in., and

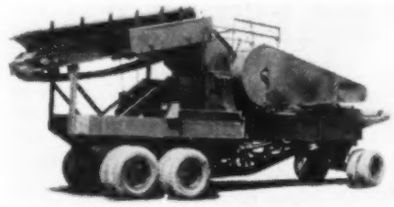
New 1948 FWD Maintainer

the frame length back of the cab is 121½ in. The design feature which especially fits the maintainer into road maintenance work is the frame height —high enough to accommodate any underbody maintenance blade. With 9:00 x 20 tires standard with the truck, the frame height of 45½ in. is provided with the truck empty and 40¾ in. with the truck loaded to capacity. The extra frame height is made possible by high arched springs and overhead spring shackle mounting. Balanced load distribution is another important factor claimed by the manufacturer. Design of the maintainer concentrates the load on the rear axle and as a result the blade action is more regular.

2

New Portable Quarry Plant

A new line of 2-unit portable crushing and screening plants for quarry operation is now in production by Pioneer Engineering Works, Inc., Minneapolis, Minn. In these plants, because two separate chassis on pneumatic tires are used, larger crushers and screens can be built into each unit without making the unit weight excessive. The plant arrangement is



Pioneer 2-Unit Plant

such that primary feeding and crushing is done on the first unit, leaving the second for secondary crushing and screening. It is thus possible to combine balanced units to keep the maximum flow of material through each plant. Another important feature is the split feed arrangement to the screens of the secondary plant. This arrangement provides two complete screening surfaces for specification material, thus doubling the screening area of the plant. The jaw crusher in the primary unit may be a 1536, 2036 or 2436. The roll crusher in the secondary may be a 40x22 or 54x24, with the screen a 4x10 or 4x12 on each product deck. A gravel primary is also available with either a 1036 or 1536 jaw crusher and a 4x6 deck screen. For gravel installations added sand rejection is provided by the screen in the primary.

3

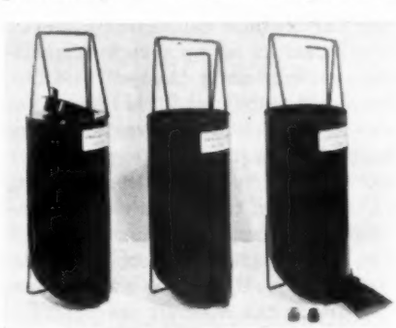
Magneto Selector

A completely new method of presenting magneto replacement information has been introduced by the Wico Electric Co., West Springfield, Mass. It is a new durable plastic selector, 9x4 in. and takes the place of many pages of replacement tables. It shows Wico models for over 190 tractor and engine models made by 15 leading manufacturers. There are two rotating selector wheels, one for flange mounted and one for based mounted magnetos. Around each wheel are shown the names of engine and tractor manufacturers, and the models they make. To find the right magneto model for a given engine, it is simply necessary to place the arrow on the wheel next to the engine name and model. Then through the four windows in the selector are shown the information necessary to select and mount the Wico magneto that is suitable. The selector will be sent on request.

4

Crackfillers and Pouring Cans

A new crack and joint filling can, announced by Butler Industries, Inc., Detroit, Mich., has 1 in. of insulation which gives it a thermos jug effect maintaining pouring materials at practically a constant temperature.



Butler Crackfillers and Pouring Cans

It is stated to be particularly adapted for the rubber compound materials where a proper pouring temperature must be maintained. The Crackfiller can be set on any flat surface. The pouring valve is located ahead of the

Mail Inserted Card

For data on equipment described on these pages. See also inquiry blank on page 129.

container so that all blind work is eliminated. The rod controlling the valve extends to the handle where it is convenient for operation. The can has a capacity of 1½ gal. Another Butler model is the same overall size and shape as the model described above, but is not insulated. It is a 3-way unit of many purposes. As the 2 nozzles and the detachable pouring spout are standard equipment, it may be used to fill cracks with regular asphalt or with heavy material and may be used as a pouring can for road and street patching.

5

New Wheel-Tractor

A new 125 hp. diesel wheel tractor has been announced by the M-R-S Manufacturing Co., Flora and Jackson, Miss. The tractor weighs 13,700 lb. and is powered by an International Harvester, 4-cycle, 6-cylinder diesel engine of the valve-in-head type.

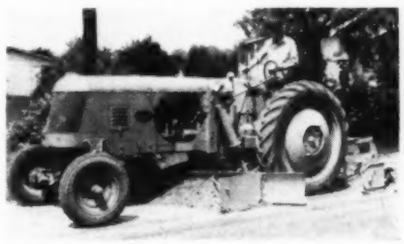
M-R-S "125" Tractor

Having low-pressure drive tires and approximately 70% of its weight on the drive axle it is said to have ample tractive ability for the operation of large-size equipment of many different kinds. The tractor has six speed and power ranges. Range No. 1 offers speeds up to 37 m.p.h., while range No. 6 with a first-gear speed of 2.08 m.p.h., provides up to 19,552 lb. of available tractive effort. Traction of the drive wheels may be increased when necessary, to match the tractive effort made available in the lower speed ranges, by the addition of special weights. In this way the drive-axle load can be brought up to as much as 25,900 lb. Among the advantages claimed for the new tractor are exceptional ease of handling and driver comfort.

6

New Berm Leveler

A berm leveler for maintenance along hard-surfaced roads has been announced by The Huber Manufacturing Co., Marion, O., as the latest auxiliary unit for attachment to its maintainer. A reversible assembly for boulevard and divided highway maintenance and unobstructed view of the work being done are other features of this maintainer application. Hydraulic controls operate the blade of the maintainer to the angle and depth necessary to carry sufficient material to the pavement edge. An apron, or gathering blade, is bolted to the maintainer moldboard. This carries excess material picked up in cutting the berm and deposits it in ruts or low spots along the edge of the surfaced road.



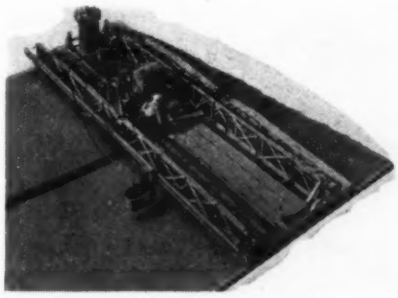
Huber's New Berm Leveler

The rear wheel of the maintainer, which runs along the edge of the pavement, compresses this material. The berm leveler, mounted on the rear of the maintainer, is adjusted by hydraulic control to the desired pressure for moving excess material and feathering it out to form a level berm. Small stones and dirt left by the berm blade are removed from the edge of the pavement by a road cleaner blade mounted on the rear of the leveler attachment.

7

New Combination Finishing Machine

A new machine for automatic spray curing, brooming, belting, burlap dragging, and installing permanent traffic lines has been developed by Flex-Plane Co., Warren, O. The equipment, known as the Flex-Plane Combination Machine, performs simultaneously any three of the above operations. Attachments for specific work



Flex-Plane Combination Machine

are installed on the basic automatic spray machine. All attachments are quickly and easily interchangeable in the field. The machine is available in standard widths, 10-12.5 ft. and 20-25 ft., and in special widths on request. The Flex-Plane Combination Machine can be equipped to use any or all attachments.

8

New Hammer Bit

A new hammer bit designed for drilling granite, announced by the New England Carbide Tool Co., Inc., Cambridge, Mass., is tipped with carbide, has two deep flutes and a tapered shank. The tapered shank is designed to fit the Rawl chuck, because these chucks fit any electric or pneumatic hammer. The hammer bit will be made in sizes ⅜ in., 7/16 in., ½ in., ⅝ in., ¾ in. and 1 in. This new drill was developed expressly to drill accurate holes in granite, pebble concrete, hard brick, and other hard masonry materials.

9

New 2-Wheel Scrapers

A new series of 2-wheel hydraulically operated scrapers, announced by Be-Ge Manufacturing Co., Gilroy, Calif., are designed for use with fast industrial type rubber-tired tractors. The current models SS 630 and SS 750 have heaped bowl capacities of 3.2 and 5.4 cu. yd. and struck capacities of 2.6 cu. yd. Cut, lift, dump, and spread operations are fully hydraulic, and are instantly controlled

New Be-Ge Scraper

by the operator. A uniform depth of cut is stated to be maintained by positive down pressure on the blade, which is also lifted hydraulically. The scrapers have forced "roll-out" ejection. Powered apron rises independently of bowl to insure maximum loads. Primarily self-loading, the low overall height of the open top bowl permits loading by shovel or drag line and affords operator a clear view of all operations. Bowl width and overall width of tractor including tires are the same. The wheels are cantilever mounted and roll on tapered roller bearings. Wheels and tires can be easily changed without dismounting axle.

10

Increased HP Ratings for Tractor

Increased horsepower ratings for the 6-cylinder International TD-18 diesel crawler tractor have been announced by the Industrial Power Divi-

sion of International Harvester Co., Chicago, Ill. At 1300 r.p.m., the TD-18 now develops 97 h.p. at the flywheel, 91.5 belt h.p. and 80.5 drawbar h.p. New cylinder heads, manifolds, fuel system, and a compression ratio of 15½ to 1 give better fuel economy and more power. Design of the cylinder heads provides better cylinder

International TD-18 Diesel Tractor

head cooling. Intake and exhaust manifolds are mounted on opposite sides of the engine. The new International fuel injection system delivers accurately metered, equal quantities of fuel to each cylinder in accordance with the needs of the engine. The injection pump has two plungers, each serving three cylinders. The injection nozzles are single-orifice type set, with precombustion chambers, into the cylinder head at an angle which promotes complete combustion of low-cost fuels. The injection pump has a quick-acting, variable-speed governor with torque control.

11

Dynamometer Measures Equipment HP Requirements

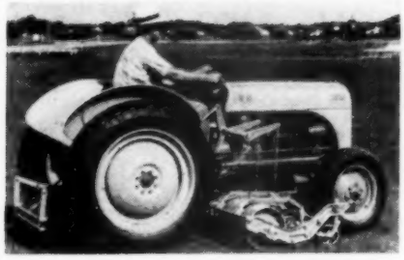
A new dynamometer designed and built by The Firestone Tire and Rubber Co., Akron, Ohio, is claimed to measure horsepower requirements for heavy-duty earthmoving and construction equipment more accurately than any previous piece of equipment. The dynamometer has a draw-bar pull measurement capacity of 100,000 lb. It accurately charts and permanently records draw-bar pull and draw-bar horsepower under all conditions. The test unit is constructed on a 4 ft. by 2 ft. truck-tractor chassis. Component parts include a water tank to allow variable weights, diaphragm type draw-bar pull measurement devices at front and rear, and a fifth wheel with time and distance instrumentation. Except for the chassis, all parts and instruments were specially designed by Firestone's development department engineers.

Dynamometer Clocking Draw-Bar Pull of a Tournadozer

12

New Tractor Mower

A new mower announced by Roseman Tractor and Mower Co., Evanston, Ill., cuts a swath 7 ft. wide. The unit consists of three Roseman hollow roller drive mowers mounted on the new Ford tractor, or the Ford Trac-



Park Challenger Mower

tor Ferguson system. Features claimed for the mower include: mobility, speed of operation, ease of raising the mower hydraulically, plus the ability to cut close to trees, a greater degree of traction, the elimination of wheel marks, the ability to cut ahead of the rear wheels, and to overhang curbs without dropping off —thereby eliminating the unsightly fringe that involves considerable hand trimming. To obtain the greatest utility from the Ford tractor the Roseman Park Challenger attachment has been designed to attach or detach in a few minutes' time, thereby freeing the tractor for any of its many other uses.

13

New Concrete Cutter

A new concrete cutting machine designed for cutting pavements of all types for trenches, weakened planer joints, core samples, curbs, ramps, etc., has been announced by Felker Manufacturing Co., Torrance, Calif. The machine is powered by a 2-cylinder, 10 h.p. gasoline engine. The spindle is mounted in ball bearings and is double ended, permitting either right or left hand uses of the cutting wheel. In order to protect the diamond wheel against sudden shocks

Felker Di-Met Concrete Cutter

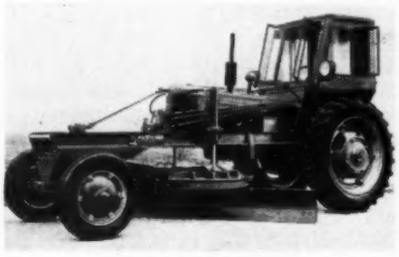
when starting cuts, it is gradually eased into the work by a hydraulic downfeed retardant. A large tank carries water which floods the wheel when in cutting position. A positive water turn-on operates as the blade is lowered, and shuts off when retracted. The concrete cutter is especially designed for use with the Felker DI-MET segmented type diamond wheels.

They are made of very stiff, tempered steel with diamond sections made as inserts. The machine accommodates wheels up to 18 in. O.D., permitting a 6½ in. maximum depth of cut.

14

New Maintainer

A new Model 30 power maintainer, now in production by Meili-Blumberg Corporation, New Holstein, Wis., is built around a modified International "H" power unit of 31.5 H.P. The Model 30 is hydraulically controlled from the operator's seat and features attachments which include leaning front wheels, power broom, V-type snowplow, bulldozer blade, scarifier, and fully enclosed cab and lights. The



Model 30 Maintainer

maintainer operates at five forward speeds ranging from 2.5 to 15.7 M.P.H. and one reverse speed. Its blade clearance is 12 in. and maximum blade pressure approximately 5,000 lb. The maintainer is designed particularly for use by State highway departments, counties, towns, cities and small contractors who require a lightweight grader to perform both construction and maintenance jobs.

15

Scarifier and Pulverizer

A machine designed to rip up and pulverize old oil mats, asphalt and macadam pavements so that this material can be reused in the reconstruction of these roads has been placed on the market by the Wood Manufacturing Co., North Hollywood, Calif. The machine, in brief, is an extra heavy duty scarifier and pulverizer. It is stated that any road mat that can be scarified with a motor patrol can be scarified and pulverized in one

The Wood Preparizer

operation with this machine. An outstanding feature of the machine is the hydraulic jack mounting, which gives it perfect control of the scarifying and pulverizing depth. The old mats can be peeled off the base and pulverized without disturbing the base material. It is stated that many uses have been found for this equipment on new construction, especially road-mix and mixed-in-place jobs, which call for soil preparation. The hard-baked adobes and sand clays used in soil cement and emulsified asphalt stabilizaton can be pulverized as well as the cemented gravels, decomposed material and caliches used in slurry base courses. It can be used as a material blender, an aerater, or a drier.

16

New 2-in. Pump

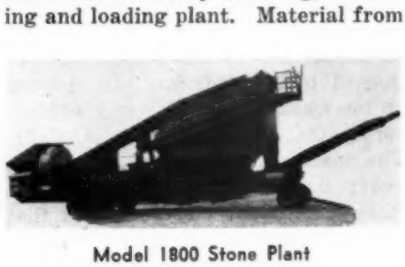
A new gasoline engine driven 2-in. portable high pressure pump, now in production by The Jaegers Machine Co., Columbus, O., is slightly more than 2 ft. square and weighs only 150 lb. including pneumatic tires, mounting frame and telescoping towing pole. At 10-ft. suction lift, this pump has a range of volumes and pressures from 135 g.p.m. at 10 lb. discharge pressure, to 30 g.p.m. at 60 lb. discharge pressure, and a maximum shutoff pressure of 70 lb. Unusual pumping efficiency and pressure characteristics of Model 2 PAFH are said to accrue directly from its special design and the use of a more powerful than usual engine. The maker stresses its exclusive "Sure-Prime" feature. Fast, unfailing priming ability is attributed to two simultaneous, but wholly independent, automatic actions. One is the inherently rapid and positive priming action which is provided in the pump design. The second is termed "jet-priming" and consists of drawing air from the pump suction line to the impeller by entraining it in a high-velocity stream of water.

Jaeger Model 2 PAFH Pump

17

New Rock Crushing Equipment

The Universal Engineering Corporation, Cedar Rapids, Ia., has added to its line of crushing equipment the Model 1800 secondary stone plant for production of road rock and agricultural limestone. It consists of a Universal hammermill on a truck together with a double deck vibrating screen, rotovator, conveyors, hoppers and drives necessary for a complete and balanced secondary crushing, screening and loading plant. Material from any standard primary crusher goes directly to the screen where finished aglime and road rock are screened out. Oversize is delivered to the Hammermill. The output of the mill is returned to the main conveyor by means of an under conveyor and Rotovator wheel and back to the screen. Finished products are delivered to trucks or stock piles by belt conveyor. Power is applied to the side of the



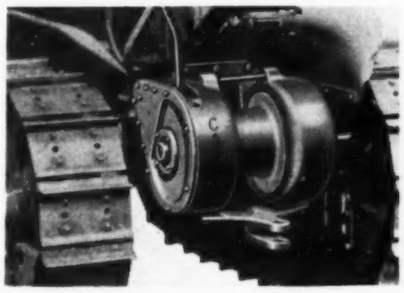
Model 1800 Stone Plant

plant through a universal joint to a special roller bearing mounted back shaft. The Model 1800 is available with three sizes of Hammermills with aglime capacities from 20-75 TPH and road stone from 50-125 TPH.

18

New Tractor Winch

A winch to fit wheel and crawler tractors in the 15 to 50 h.p. range is now in production by Pacific Car and Foundry Co., Renton, Wash. The winch provides a line pull up to 6,500 lb. It is compact, small, easily mounted and does not upset tractor balance. It features automotive-type



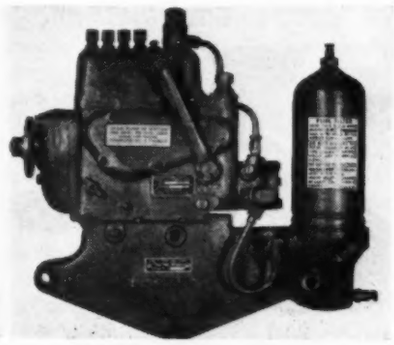
Carco Model "S" Winch

gears, friction cone clutch, a simple self-energizing brake, ball and roller bearings, oil bath lubrication and a one-piece Carcometal case. One convenient control makes operation easy from the ground or from the tractor seat. One easily accessible nut takes up brake wear and the clutch is simply and quickly adjusted.

19

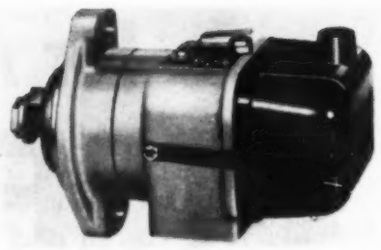
Diesel Fuel Injection Pump

The Industrial Power Division of International Harvester Co., Chicago, Ill., has announced a field replacement package unit containing a new single-plunger International diesel fuel injection pump for replacing the older four-plunger pumps found on series "35" and series "40" diesel engines. New high-pressure fuel lines and all necessary accessories are included.



Diesel Fuel Injection Pump

No modifications are required to install the new unit. Cost of the unit is stated to be less than the expense of a major overhaul on the old pump. Features of the new single-plunger pump include faster governor action and more accurate fuel metering and injection.



New "AJ" Magneto

20

New Magneto

A versatile new "AJ" magneto, weighing only 3 lbs., announced by the Automotive Division of Thomas A. Edison, Inc., West Orange, N. J., is designed especially for small and medium one- and two-cylinder gasoline engines. It can be used on almost anything from lawnmowers, motorboats and pump engines to industrial and construction equipment. The new magneto, now in production, is small, compact and gearless. Its low shaft height makes it easily adaptable to various engine sizes and designs. It is built to go on various types of flange mountings. All parts are easily accessible.

21

Construction Equipment Floodlight

A new floodlight especially engineered and designed for service on power shovels, road building equipment, cranes, tractors and other construction equipment, produced by Metal Spinning Division of Phoenix Products Co., Milwaukee, Wis., provides extra high light intensity and spread by means of a sealed-beam unit. Features of the floodlight include an unusually heavy case, spun

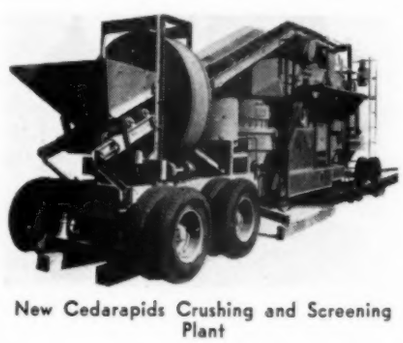
"Sturdilite" Floodlight

from 18-gauge steel; a spring-mounted socket with compression springs that pull the bulb firmly in contact with the supporting ring, and clamping action that makes accidental loosening of the bulb impossible; a virbation-absorbing mounting base, floating in rubber. Dimensions of the unit measure 10½ in. in length, 9 in. width, and 12¾ in. height (including mounting base). The lights are offered in three voltages: 4-6 volt, 12-16 volt and 110-120 volt.

22

New Crushing and Screening Plant

A new portable crushing and screening plant in which the crushing is handled by a cone crusher has been announced by Iowa Manufacturing Co., Cedar Rapids, Iowa. This new plant is



New Cedarapids Crushing and Screening Plant

used for secondary crushing of rock or gravel where the material being fed is fairly uniform in size and requires a reduction of only one or two sizes, and where fines are not particularly desired. It is frequently used in a unitizing plant set-up where the primary crushing is handled by a portable primary or a scalping unit. This new plant consists of a 22-in. Symons pedestal-type cone crusher, 42 in. x 10 ft. double-deck horizontal vibrating screen, and the necessary conveyors, chutes, drives, and hoppers. The truck is offered with a choice of steel wheels or pneumatic tires.

MANUFACTURERS' LITERATURE

23

Trailer

A trailer that provides its own loading ramp is illustrated and described in a bulletin issued by Arthur Rehberger & Son, Inc., 320 Ferry St., Newark, N. J. Equipment is driven on or off the trailer under its own power. The use of blocking, skidding and winching is eliminated.

24

Improved Hand Power Cutters

The new redesigned improved Porter hand power cutters are featured in a circular issued by H. K. Porter, Inc., Somerville, Mass. These cutters are used for cutting wire, cable, concrete reinforcing rods, etc. The folder describes the complete line and recommends the cutter that should be used for each kind of cutting job.

25

Hydraulic Power Unit

A new bulletin has been published by Hydro-Power Division, The Hydraulic Press Mfg. Co., Springfield, O., covering its latest midget size hydraulic power unit known to the trade as "Ten Ton Tony." This bulletin is both informative and helpful to the user of road machinery who is endeavoring to make his present equipment more productive and to simplify many toilsome operations that can best be handled hydraulically. It describes and explains in detail a number of typical applications of "Ten Ton Tony." Complete performance data are given.

26

Welding Bulletin

New Welding Products Bulletin 1047-W, released by the American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill., is a treatise on how to keep equipment operating and producing through Amsco conservation welding. Twenty-eight pages of photographs, drawings, and descriptions explain the low-cost method of repairing, rebuilding, reclaiming, and hardsurfacing with Amsco welding rods and electrodes

Complete characteristics and specifications are given for each rod or electrode as well as ingenious shortcuts that have solved problems for typical equipment users. A handy alphabetical reference index is provided which shows, for each major field, the exact rod to use for any specific application.

27

Power Hoists

Domestic power hoists are featured in a bulletin of Domestic Engine & Pump Co., Shippensburg, Pa. Heavy duty, medium duty and light duty single and double drum gasoline engine driven hoists are illustrated and described and their specifications are given. Single and double drum hoists for electric motor or gasoline power and belt and dredge hoists are also pictured and described. Two pages are devoted to hoist data.

28

Electric Plant

An entirely new bulletin covering their 700 watt electric plant has been printed by the Universal Motor Co., Oshkosh, Wis. The new literature describes and illustrates this one-cylinder, air-cooled model and contains full engineering specifications. It outlines the many and diverse applications of this popular 700 watt size, which is available in either AC or DC models.

29

Bituminous Mixing Plants

A new 36-page catalog, describing the Cedarapids line of batch-type bituminous mixing plants, published by Iowa Manufacturing Co., Cedar Rapids, Ia., contains detailed descriptions and specifications on six models of batch-type plants. Standard equipment that make up these plants is described in detail. Included in the catalog is a two-page discussion on the advantages of batch-type plants for bituminous mixes and a description of the flow of material and sequence of operation of batch-type plants. In addition, the book has a 2-page glossary of terms applying to the bituminous construction field.

30

Le Roi Construction Products

A general bulletin on Le Roi construction products has been issued by Le Roi Co., Milwaukee, Wis. Included in it are descriptions and illustrations of the new Airmaster compressor and the Tractair, a completely integral unit combining all the utility of a 105 c.f.m. compressor with the versatility of a 35 h.p. tractor. The complete Le Roi-Cleveland line of contractor's tools; paving breakers, rock drills, diggers, tampers, wagon drills and accessories are described and fully illustrated. Thirty-six illustrations are dispersed through the text including material on the Le Roi-Centaur highway mower, standard gasoline power units and package generators in 5, 7½, 10, 15 and 20 KW sizes.

31

Crushing and Screening Plants

A 2-unit portable crushing and screening plant is featured in a new catalog prepared by the New Holland Manufacturing Co., Mountville, Pa. Pictures show the 1-man, 1-engine operation built around the New Holland Model 3030 double impeller breaker. A coupon offers complete details and a showing of "The New Stone Age," sound movie in natural color.

WITH THE MANUFACTURERS & DISTRIBUTORS

Conners Appointed by Lima

J. T. Conners

J. T. Conners, Conners Equipment Co., 851 Leader Bldg., Cleveland, O., has been appointed agent for northwestern Ohio for Lima Shovel and Crane Division of Lima - Hamilton Corporation, Lima, O. Mr. Conners is well known in the shovel business in this section, having been associated with the industry for the past 30 years. After 18 months active service in France during World War I, he entered the shovel business and served in various engineering and sales capacities until 1946, when he formed the Conners Equipment Co., representing a number of firms selling to the heavy construction industry.

Penflex Appoints New Plant Manager

Charles W. Young has been appointed plant manager of Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa. Mr. Young assumes his duties with wide experience in the manufacturing methods and procedure of the complete line of Penflex flexible metallic hose, tubing, and couplings. Employed by the company for over 20 years, Mr. Young has participated in the supervision of various departments throughout the plant.

General Tire Promotions

Two promotions in the manufacturing personnel of The General Tire & Rubber Co.'s foreign operations have been announced. Howard Swires will leave the position of assistant plant superintendent of General's Mexico affiliate to become plant manager of the company's new Argentine affiliate at Buenos Aires. Joe Delaplane, formerly with the facility engineering department, has been named to succeed Swires.

New Administration Building Opened

Independent Pneumatic Tool Co., Aurora, Ill., manufacturers of Thor portable power tools, has opened a new administration building adjacent to its main works at Aurora, Ill. The building, constructed and equipped at a cost of $1,500,000, will accommodate Thor's entire executive and administrative staff, the major portion of which was transferred to Aurora from Chicago for consolidation with other office divisions previously located within the Aurora works. The company's Chicago sales branch will retain temporary headquarters at the former general office address, 600 West Jackson Blvd., until construction of a new branch office building is completed sometime in the fall.

Joins H. O. Penn Staff

Harold S. Barber has joined the sales force of the Mineola, N.Y., branch of the H. O. Penn Machinery Co. Mr. Barber has had 10 years of varied engineering and sales experience.

New Davey Distributor

Larkin Machine & Equipment Co., Inc., Rockville Centre, N.Y., has been appointed to a full Davey dealership by Davey Compressor Co., Kent, O., for Nassau, Suffolk, Queens, Kings and Richmond Counties, New York.

Raybestos Appointments

Jerome W. Brush, Jr., has been appointed assistant director of marketing and merchandising, a newly created department of Raybestos-Manhattan, Inc., with offices at 120 Broadway, New York City, which will co-ordinate and supervise the merchandising policies, advertising, market research and analysis, public relations and publicity programs of the corporation's several divisions on their asbestos and automotive rubber products. David E. Cunningham succeeds Mr. Brush as marketing supervisor of The Raybestos Division, Bridgeport, Conn., and will direct divisional activities in conjunction with the corporation's Marketing and Merchandising Department.

Wayne Crane Appoints Gifford

Samuel H. Gifford has been appointed sales representative of Wayne Crane Division, American Steel Dredge Co., Inc., Fort Wayne, Ind. He will take over some of the company's western territories.

Faulkner Joins Frantz Tractor Co.

W. J. Faulkner

Wm. J. Faulkner has resigned as industrial sales manager of Allis-Chalmers Tractor Division to become vice president and part owner of Frantz Tractor Co., Allis-Chalmers' New York dealer. In

Tyson Bearing Appointments

H. I. Lewis, President of the Tyson Bearing Corporation, Massillon, O., has announced the following new appointments and assignments in the Tyson sales organization as part of a program to expand and improve sales and service facilities to Tyson customers and distributors:

George C. McMullen, with Tyson for 16 years is vice president in charge of sales. W. H. Oexle, for the past 12 years with L. S. Starrett Co., Athol, Mass., joins Tyson as general sales manager. Herschel J. Deal, vice president, with Tyson since 1933, is in charge of the Midwest territory with headquarters in Chicago. Ivan C. Mann, formerly manager of sales, is now assistant manager of sales. R. R. Flaisig is Tyson representative in Southern Ohio territory, with headquarters at the factory. E. M. Smith is in charge of northeastern territory with headquarters in Philadelphia. Carl M. Behm is now Tyson representative in Northern Ohio.

Why YOU should PLAN TO COME TO THE ROAD SHOW

BETTER ROADS FOR A BETTER WORLD — 45th Annual Convention and Road Show — SOLDIER FIELD CHICAGO — JULY 16-24, 1948

Over 5000 pieces of equipment!

Imagine over 30 acres — a small farm—filled with construction machinery... some of it operating... some of it never before shown. Here is a practical picture backed with new information, new data, that shows the way to better performance and increased efficiency.

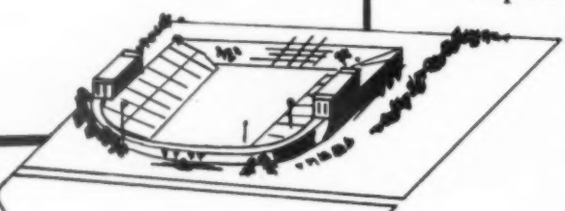
IT IS THE MOST DRAMATIC SPECTACLE IN CONSTRUCTION HISTORY — A MUST FOR EVERY CONSTRUCTION MAN.

THERE is a $1,500,000,000 road program for 1948 — the greatest in construction history. This stupendous figure represents the largest appropriation ever made for construction of highways and airports. By seeing this machinery exhibited at the Road Show you have the opportunity to get ready for your part in this greatest construction program of all time. If for no other reason than this, you should attend the Road Show.

State, county and municipal governments will require approximately $240,000,000 for equipment for maintenance work in 1948. Another $265,000,000 worth of equipment will be needed for new construction. It is conservatively estimated that an additional $150,000,000 for new equipment will be required to bring construction equipment inventories up to normal.

TECHNICAL SESSIONS YOU CAN'T AFFORD TO MISS

There will be discussions on highway engineering, grade separations, airport construction, concrete and bituminous highway construction, soil compaction, highway terminals, the contract system and day labor, tar soil stabilization, cement soil stabilization, highway safety, control of city pavements, snow removal, highway maintenance, elevated and depressed highways, express highways, radio communications in highway control, weights and sizes of vehicles, bridge construction practice, property assessment for highways, public relations, legal affairs, highway finance, gross weights on highways and on many other topics that are so much a part of your daily work. Bring yourself up-to-date on the latest phases of these important subjects.



EVERY DAY AN OUTSTANDING DAY!

Friday, July 16	Distributors Day
Saturday, July 17	International Day
Sunday, July 18	Educators and ARBA Student Chapters Day
Monday, July 19	Associated General Contractors Day
Tuesday, July 20	ARBA Contractors Day
Wednesday, July 21	County Day
Thursday, July 22	Municipal and Airport Day
Friday, July 23	All States Day
Saturday, July 24	Chicago Day

45th ANNUAL CONVENTION AN
INTERNATIONAL ROAD SHO
SOLDIER FIELD • JULY 16-24, 194

AMERICAN ROAD BUILDERS ASSOCIATION
International Building, Washington 4, D. C., U. S. A.

addition to his duties as vice president he will act as general manager. Mr. Faulkner joined the Allis-Chalmers organization in 1941 and was assigned to direct the complicated wartime activities in the company's Washington, D.C., office. In May, 1945, he was appointed industrial sales manager, directing sales of industrial products to all Allis-Chalmers industrial tractor dealers in the United States and Canada.

Appointed Sales Representative

J. K. Dolan

John K. Dolan has been appointed sales representative in the Chicago district office of Marion Power Shovel Co., Marion, O. This district covers northern and central Illinois, southern Wisconsin, eastern and central Iowa and southwestern Michigan. The Marion offices in Chicago are located in Room 1206 McCormick Bldg., 332 South Michigan Ave. D. A. Riser is district manager.

Appointed Chief Engineer

H. W. Rockwell

Harvey W. Rockwell has been appointed chief engineer of the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. Mr. Rockwell has been with LaPlant-Choate since 1937. After a period of practical shop experience, he was assigned to duties in the engineering department and has progressively served that department as assistant chief engineer, chief engineer, Hydraulic Division, and chief engineer in charge of all development and patent activities. He received his engineering education at Iowa State College, Ames, Iowa.

Opens New Factory Branch

Hose Accessories Co., Philadelphia, Pa., manufacturers of "Le-Hi" hose couplings and accessories, has opened a direct factory branch at 1500 South Western Ave., Chicago, Ill. Both office and warehouse are under personal supervision of Wallace W. Neeb, factory representative of the company.

CLEARING HOUSE

DEPENDABLE USED MACHINES

Link Belt 1 yd. crane
Int. TD-9 with angledozer
3300 lb. frost ball
Small Diamond road gravel plant
Butler Carscoop
Universal truck crane

TRACTOR & EQUIPMENT CO.
3521 W. 51st St. Chicago, 32

FOR SALE

1 Cat. D-4 Traxcavator No. 5T6609-W Latest Mod. IT Trackson, bucket with teeth, and bulldozer blade. Only 1400 hours. Not war surplus.

CLIFFORD WATERHOUSE
P.O. Box 172 Tel. 2-0617
Jackson, Mississippi

FOR SALE

3 Ton C.H.& E. Tandem Roller
2—10,000 Gal. Asphalt Tanks
1 Ton Portable Asphalt Plant

DARIEN CORP.
60 E. 42nd St., N.Y. 17, N.Y.

FOR SALE

One Model 3 Heavy Duty, ¾ Yard Northwest Crane with Shovel Attachments, 50' Boom and Fairleads. Serial Number 4616, A-1 Shape.

$12,000.00 F.O.B.
ALLEGAN, MICH.

FOR SALE

KOEHRING WD-Dumpster. G.E. Diesel. 6-8 cu. yd. Like new.....$6500.00
Also older model with Case gasoline Power Unit $2000.00
KOEHRING Trail Dumps, LAI Case engines, 6-8 cu. yd. Good.....$3000.00
LAI CASE Tractor, duals, air brakes. New $3000.00
RTI MINNEAPOLIS-MOLINE Tractors. Good .....$1000.00 each
AUSTIN-WESTERN Street Sweeper ASV81B. #P2010. Overhauled. Guaranteed $2000.00
NORTHERN COAL Conveyor, portable, 4 cyl. Wisc. engine. Like new....$750.00
BURCH Car Unloader. 24" x 25 ft. New belt, Model SU, ser. #3112. 4 cyl. Wisc. engine. A1 .....$950.00
AMERICAN Steel Stiffleg Derrick. 36' Mast, 80' boom with American Boiler and Sewing Engine. Used few months only. A1 .....$3250.00
GALLION Chip Spreader 12 ft. #G-23443-A. A1 .....$600.00
ROGERS 10" x 20" RB Jaw Crusher with 25 ft. elevator. Like new.....$950.00
ROGERS 18" x 24" R.B. Jaw Crusher with Feeder. Like new.....$4500.00
BUCKEYE DITCHER. #12. New 1947. A1 .....$7000.00
DEMPSTER Dumpsters LF200 late model with buckets $600.00
MARION #362, 1½ cu. yd. Shovel, ser. #7465. Cat. D-13000 engine. 60 ft. boom, fairlead, dragline bucket. Excellent condition $19,000.00
STANDARD STEEL Tarpot, 60 gal. with motor and pump, on rubber. Reconditioned $275.00
GRUENDLER 3-XB Hammermill. Rebuilt. Guaranteed $1500.00
WM. BROS. Tank Car Heater, portable, cap. 2-4 tanks. Guaranteed like new $1400.00. Orig. cost.....$2400.00

If you need booms, shovel, and backhoe attachments, clamshell, dragline buckets, —let us know. We have a big stock in our yard and save you money,—new or used.

Wenzel Machinery Rental & Sales Co.
2136 Jefferson Street
Kansas City, Mo.

PORTABLE FLUID PUMP

Another War Surplus Bargain

Brand new, in original crates, tested and guaranteed; fully portable, powered by gasoline engine, provides constant pressure (up to 25 psi) while volume can be varied from 0-30 gpm. Complete with hoses, segregator and loading valve. Made by Yale & Towne. Write for details.

WAR SURPLUS ENGINEERING SERVICE
2625 W. Pico Bl. Los Angeles 21, Calif.

1—Littleford Model Trail-O Distributor (New).....$1850.00
1—Jaeger Model CS-20 Concrete Spreader adjustable to 25 ft. (New).....$5000.00
4—Jaeger Form Tampers (New) .....$ 450.00

LORENZ EQUIPMENT CO.
547 West Rich St., Columbus 8, Ohio

FOR SALE

New 100 H. P.

FORD MERCURY POWER UNITS

Complete with self starter, generator, distributor, governor, oil-bath air cleaner, battery, special large cast iron shell radiator, oversize 19-inch diameter fan, all enclosed in a sheet metal house.

Price each $535.00

Twin Disc power take-off clutch.....each $55.00
These are new units on which we are overstocked.

GEHL BROS. MFG. CO.
DEPT. 68 WEST BEND, WIS.

FOR SALE

IMMEDIATE SHIPMENT FROM STOCK
FOB JACKSON, MISSISSIPPI

NEW

100 H.P. Murphy Diesel Power Units
160 H.P. Murphy Diesel Power Units
60-105-160 Air Compressors
5 to 8 Ton Tandem Roller
8 to 10 Ton Tandem Rollers (Surplus)
Austin-Western Badger Shovel
D4 Caterpillar (Narrow Gauge) LeTourneau Dozer
Hay Balers
Model 900 (64 HP) Oliver Industrial Tractors
FP (15 yd.) Le Tourneau Scraper
Model 840 Barber-Greene Asphalt Distributor (complete)
Model B-20 Bush & Bog Disc

USED

3—DW10 with 8 Yd. LeTourneau Scrapers completely rebuilt
1—304 Koehring Dragline (Caterpillar motor) completely rebuilt
1—¾ Koehring (New cab, Boom & General Motors Diesel Motor
1—10K Insley Dragline & Backhoe combination, rebuilt
1—12 yd. LeTourneau Scraper
1—HD10 AC Tractor & Dozer
1—HD7 AC Tractor & Dozer
1—50 Caterpillar Diesel Tractor
2—6" Wellpoint pumps (used one day)
1—Adams 51 Diesel Motor Grader
1—#10 Caterpillar (S.D) Motor Grader
1—104 Adams Blade Grader
1—125 Adams Blade Grader
1—New Linkbelt Crane mounted on 6x6 6-ton Diamond T Truck

WATKINS-ALDRIDGE EQUIPMENT CO.
912-916 So. State Street, Jackson, Miss.

Available for immediate delivery, rental or purchase, at very attractive price

Two Wooldridge Terra-Cobra self-powered Scraper units, 15 yards struck, 18 yards heaped; Cummins Diesel Engines with less than 200 hours on either machine.

Box 118, Care of Roads & Streets
22 West Maple St., Chicago, Ill.

STEEL STORAGE TANKS

6—6000 & 10,000 GAL. R.R. CAR
2—15,000 GAL. WITH COILS
12—NEW 42,000 GAL. CAP.

L. M. STANHOPE, Rosemont, Penna.

FOR SALE

1 34-E Dual Drum Ransome Paver, Hydraulic Controls, Full Length Crawlers with Power Loader, equipped with HBID Cummins Diesel Engine. Has never been used. Boom length 36'9". Delivered from factory in Spring of 1946.

Price $21,500.00
(Subject to prior sale)

VIRGINIA ENGINEERING CO., INC.
Newport News, Va.

Hydraulic Rams

Due to change in Engineers specifications we have a surplus of 300 single action rams. Compressed they are 33½" from center hole to center hole and extend to 55". Holes are 1-1/64" at either end. ½" standard pipe tap both sides for hose. O.D. 5" and I.D. 3¾". Will sacrifice.

Write or phone to

GLENN M. ROGERS, Inc.
123 Franklin Street, Buffalo 2, New York

TRANSITS and LEVELS

New or Rebuilt

Sale or Rent

Headquarters for REPAIRS—any make. Factory service. We will also buy your old instruments or take them in trade.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-24.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 N. 12th St. Philadelphia 7, Penna.

Inquiry Blank and Advertisers' Index

Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

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3 Crushers
4 Portable Plants
5 Screens

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6 Batchers
7 Finishers
8 Distributors
9 Dryers
10 Heaters
11 Plants (central)
12 Plants (travel)

III CONCRETE:
13 Batchers
14 Buggies and Carts
15 Finishers
16 Joints, Expansion and Contraction
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22 Tower
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Be sure to fill in name and address below:

Your Name ..... Title or profession .....

Name of your company or governmental department .....

Type of work for which equipment will be used .....

Street Address .....

City ..... State ..... County .....

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New By-pass eases the traffic problem of Austin, Texas

The Austin by-pass is a good example of modern highway design, including boulevard sections in which lanes carrying opposing traffic are separated. All lanes have ample width. The asphalt surface was laid by the Collins Construction Company, Austin, for Holland Page Industries, Austin.

On the Austin by-pass, as on heavily traveled streets and highways throughout America, the pavement laid is resilient, heavy-duty

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One of the chief headaches of public officials today is the problem of traffic congestion. Successful efforts to cure this ill, therefore, are of special interest to road builders. The Austin, Texas, by-pass is a good example of how engineers are tackling this problem effectively. Constructed east of the city by the Texas State Highway Department, this by-pass links U. S. 290 with U. S. 81. Both through traffic and local traffic benefit from the project in time saved, as well as in greater driving comfort and safety.

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